

YUSUF ABSOATOV

**ELEMENTLARNING KIMYOVIIY
XOSSALARI**

TOSHKENT-2013

*Kimyo – bashariyat saodati
yashirilgan mo'jizalar sohasidir:
tafakkurning buyuk kashfiyotlari
aynan shu sohada amalga oshajak.*

M.Gorkiy

Kirish

Kimyo tabiiy fanlar qatoriga kiradi. Kimyoviy bilimlar ko'lamini keng. Kimyo dunyoni tashkil etgan elementlarni ham, shu elementlardan hosil bo'lgan turli-tuman oddiy va murakkab moddalarni ham, ularni bir-biriga aylanishiga doir murakkab qonunlarni ham o'rganadi.

Ushbu qo'llanma *ikki qismdan* iborat bo'lib, qo'lingizdagi I qismda davriy sistemadagi barcha elementlarning kashf qilinish tarixi, tabiatda tarqalishi, izotoplari, olinishi, fizik-kimyoviy xossalari va ishlatilishi batafsil yoritilgan. Ayniqsa, elementlarning kimyoviy xossalari e'tibor berilgan, ya'ni, qo'llanmada juda ko'p reaksiya tenglamalari aks etgan.

Qo'llanmaning II qismida ushbu kitobda aks etgan reaksiyalarga doir va olimpiyada masalalar, ularning yechilish usullari, shuningdek, abituriyentlar uchun test savollarini berish rejalashtirilgan.

Qo'llanma, maktab, akademik litsey va kasb-hunar kollejlari talabalari va o'qituvchilari, Oliy o'quv yurtiga kiruvchi abituriyentlar, barcha kimyo fani bilan qiziquvchilar uchun mo'ljallangan.

Muallif

Vodorod – H

VODOROD: belgisi - H. 1766-yil Genri Kavendish kislotalardan metallni siqib chiqarish natijasida “yonuvchi havo” yig‘ib, uning tarkibini tekshiradi. Faqatgina 1787-yilda A. Lavuaze “havo” suv tarkibiga kirishini aniqlab beradi. Biroq kimyogar olimlarning fikricha, XVI asr boshlarida kashf etilgan va u “gidrogenium”, ya’ni “suv hosil qiluvchi”, “vodorod” deb nomlanadi. Vodorod keng tarqalgan element bo‘lib, yer kurrasida suvni ham hisobga olgan holda 1 % ni tashkil qiladi. Vodorod yunoncha “Hydrogenium” – “suv tug‘diruvchi” so‘zidan olingan, davriy sistemaning I guruh kimyoviy elementi, tartib raqami 1, atom massasi 1,0079. Ba’zi xossalari jihatidan VII guruh elementlariga ham o‘xshaydi. Yengil, rangsiz, hidsiz va mazasiz gaz; havodan 14,5 marta yengil; erkin vodorod atmosferaning yuqori qismlaridagina uchraydi. Ikkita turg‘un izotopi - yengil ^1H yoki protiy va og‘ir ^2H yoki deyteriy D dan iborat; Vodorodning radioaktiv izotopi – o‘ta og‘ir ^3H yoki tritiy sun‘iy olingan. Erkin vodorod ikki atomli molekular (H_2) dan iborat. Vodorodning zichligi $0,0000899 \text{ g/sm}^3$, $t_{\text{suyuq}} = -259,2^{\circ}\text{C}$; $t_{\text{qayn}} = -252,3^{\circ}\text{C}$. 0°C da 1 hajm suvda 0,0215 hajm vodorod eriydi.

Minerallari quyidagi minerallar tarkibida uchraydi:

turanit- $\text{Cu}_5[\text{VO}_4]_2[\text{OH}]_4$

flyurensit - $\text{CeAl}_3[\text{PO}]_2[\text{OH}]_6$ va boshqalar.

Ishlatilishi. Vodorod gidrogenizatsiya jarayonida, ya’ni suyuq yog‘larni qattiq holga keltirishda keng qo‘llaniladi. Vodoroddan keng ko‘lamda foydalaniladigan sanoat – kimyo sanoatidir. Metil spirti va ammiak sanoatida keng qo‘llanib kelinmoqda. Bundan tashqari, hozirgi vaqtda vodorod issiqlik energiyasi manbai bo‘lib hisoblanadi.

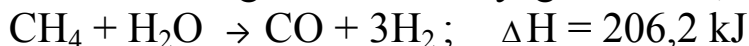
Vodorod yondirilganda atmosferani zaharli toksinlar bilan zararlamaydi. Sintetik ammiak olishda, aerostatlarni to‘ldirishda, avtogen payvandlashda va shu kabilarda ishlatiladi. Vodorod kosmosdagi eng ko‘p tarqalgan element, u plazma holida quyosh va yulduzlar massasining deyarli yarmini tashkil qiladi. Vodorod suv (eng ko‘p tarqalgan), toshko‘mir, neft, tabiiy gaz, hayvonlar va o‘simliklar organizmi tarkibiga kiradi. Vodorod tabiiy gazlar, shuningdek, suvdan elektrolizlab olinadi. Vodorod fan texnikaning juda ko‘p sohalarida qo‘llaniladi.

Qotishmalari. Korroziyadan saqlash uchun vodorod minerallari ishlatilib, qotishmasi olinadi.

Olinishi: Laboratoriyada vodorod olish uchun rux metalliga kislota ta’sir ettiriladi:



Sanoatda vodorod tabiiy gazlardan, suv gazidan, suvni elektroliz qilish, koks gazi, neftni qayta ishlashda hosil bo'ladigan gazlardan olinadi. Masalan, tabiiy gaz tarkibida metan 800°C da katalizator (nikel) ishtirokida suv bug'i bilan reaksiyaga kiritilsa, vodorod hosil bo'ladi:



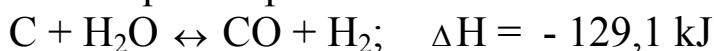
Metanning chala oksidlanishidan CO bilan H_2 larning aralashmasi hosil bo'ladi;



Sanoatda vodorod asosan metanni kislorod va suv bug'i orasidagi reaksiyasi asosida olinadi;



Shuningdek, suv bug'ini cho'g'langan koksga ta'sir ettirish usuli bilan olinadi: 1000°C da koks bilan suv bug'I orasida quyidagi muvozanat qaror topadi:



Hosil bo'lgan aralashma suv gazi ($\text{CO} + \text{H}_2$) deyiladi. Suv gazidan vodorodni ajratib olish uchun gazlar aralashmasi katalizator (Fe_2O_3) ustidan o'tkaziladi.

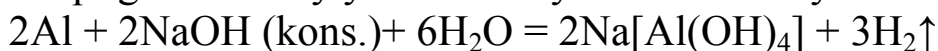


Bu aralashma bosim ostida suvda eritiladi. Ba'zan aralashma suyuq havo bilan qattiq sovutiladi, bunda karbonat angidrid qattiq holatga o'tadi. Is gazidan vodorodni tozalash uchun gazlar aralashmasi issiq natriy ishqor eritmasiga yuboriladi. Natijada, is gazi yutiladi, chunki ishqor bilan is gazi birikib natriy formiatni hosil qiladi. Cho'g'langan ko'mirga suv bug'i ta'sir ettirish usuli:



Chinni yoki temir quvurga joylashgan temir qirindisi yoki mixlarga yuqori temperaturadagi suv bug'iyuborish bilan amalga oshiriladi. Lekin bu usul u qadar katta ahamiyatga ega emas.

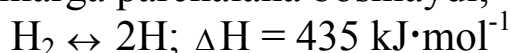
Ishqorga Aluminiy yoki kremniy ta'sir ettirish yo'li bilan:



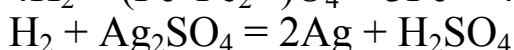
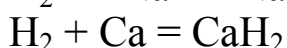
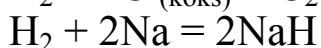
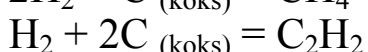
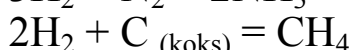
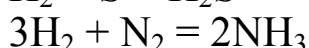
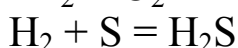
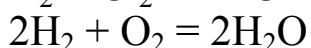
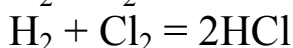
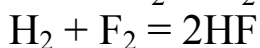
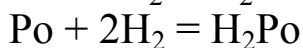
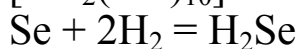
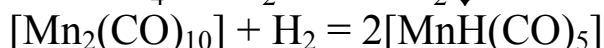
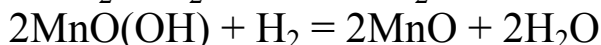
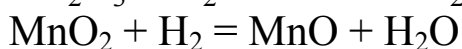
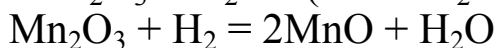
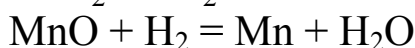
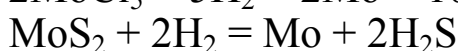
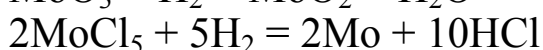
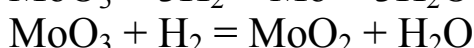
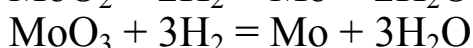
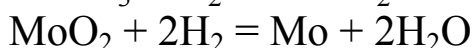
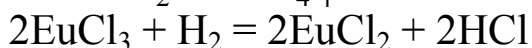
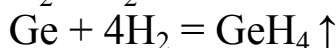
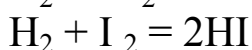
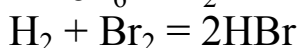
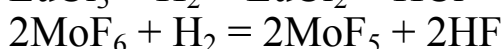
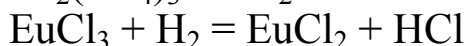
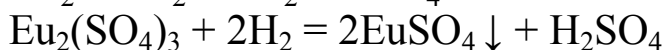
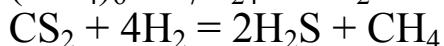
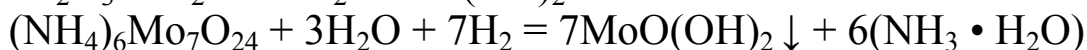
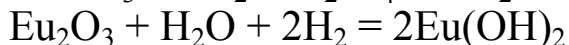
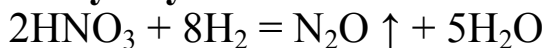
Aerostatlarni vodorod bilan to'ldirishda shu usuldan foydalaniladi.

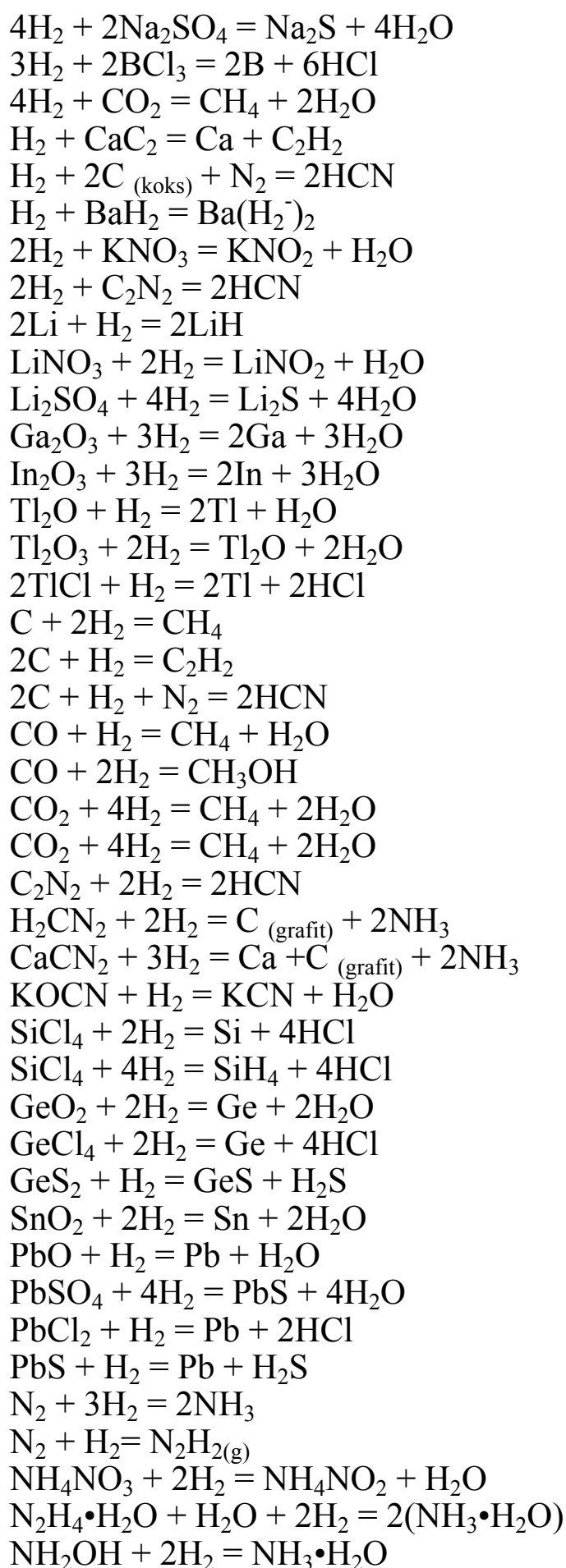
Fizik xossalari: vodorod molekulasida juda mustahkam, kam qutblanuvchan, yengil va harakatchan kichik zarrachadir. Shu sababli vodorod nihoyatda past temperaturada -259°C suyuqlanadi va $-252,6^\circ\text{C}$ da qaynaydi (bu jihatdan vodorod faqat geliydan keyin turadi); vodorod

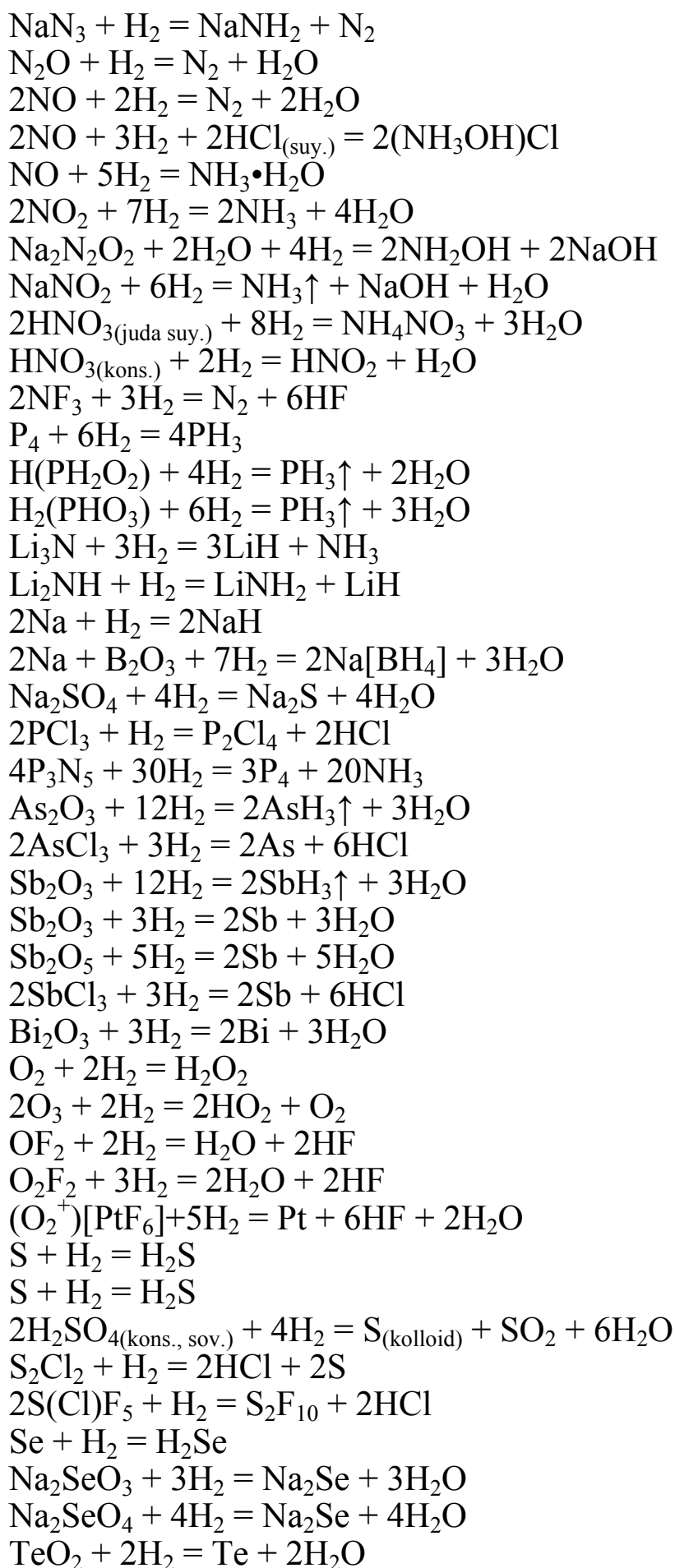
suvda va organik erituvchilarda oz eriydi. Qattiq vodorod geksagonal kristall panjaraga ega. Vodorod molekulari 2000⁰C dan yuqoridagina atomlarga parchalana boshlaydi;

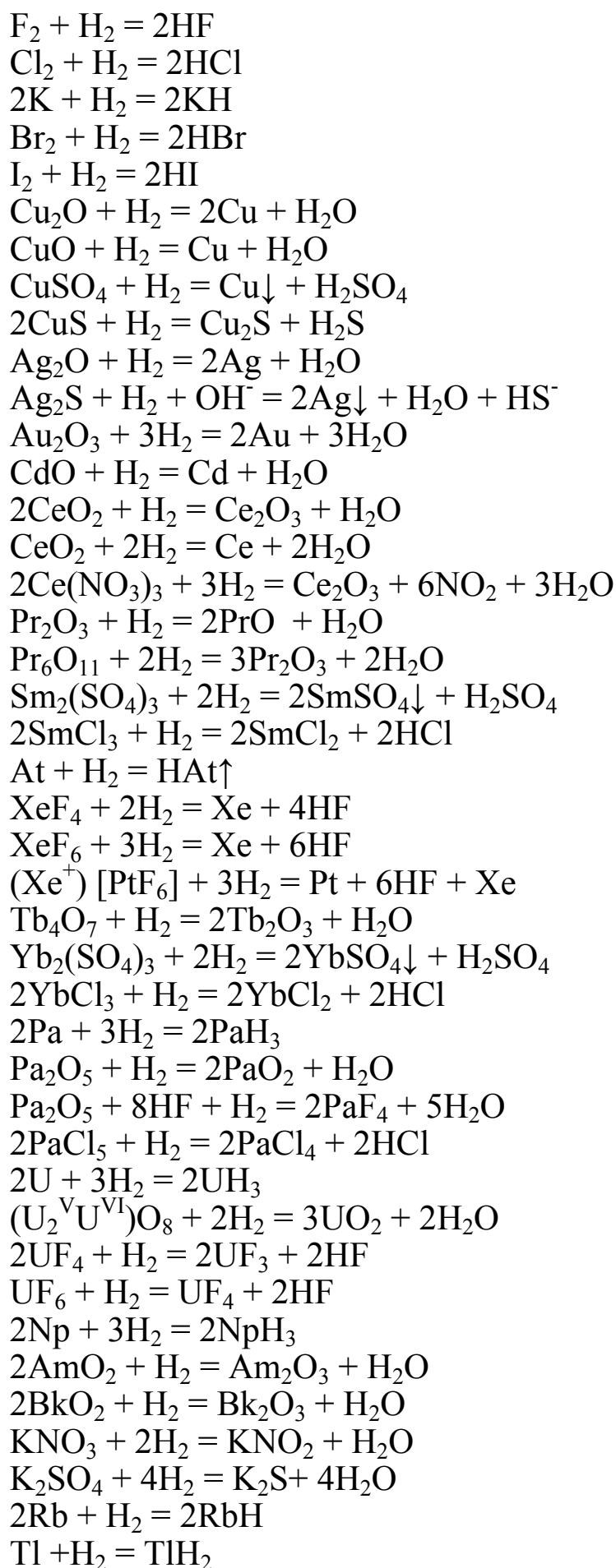


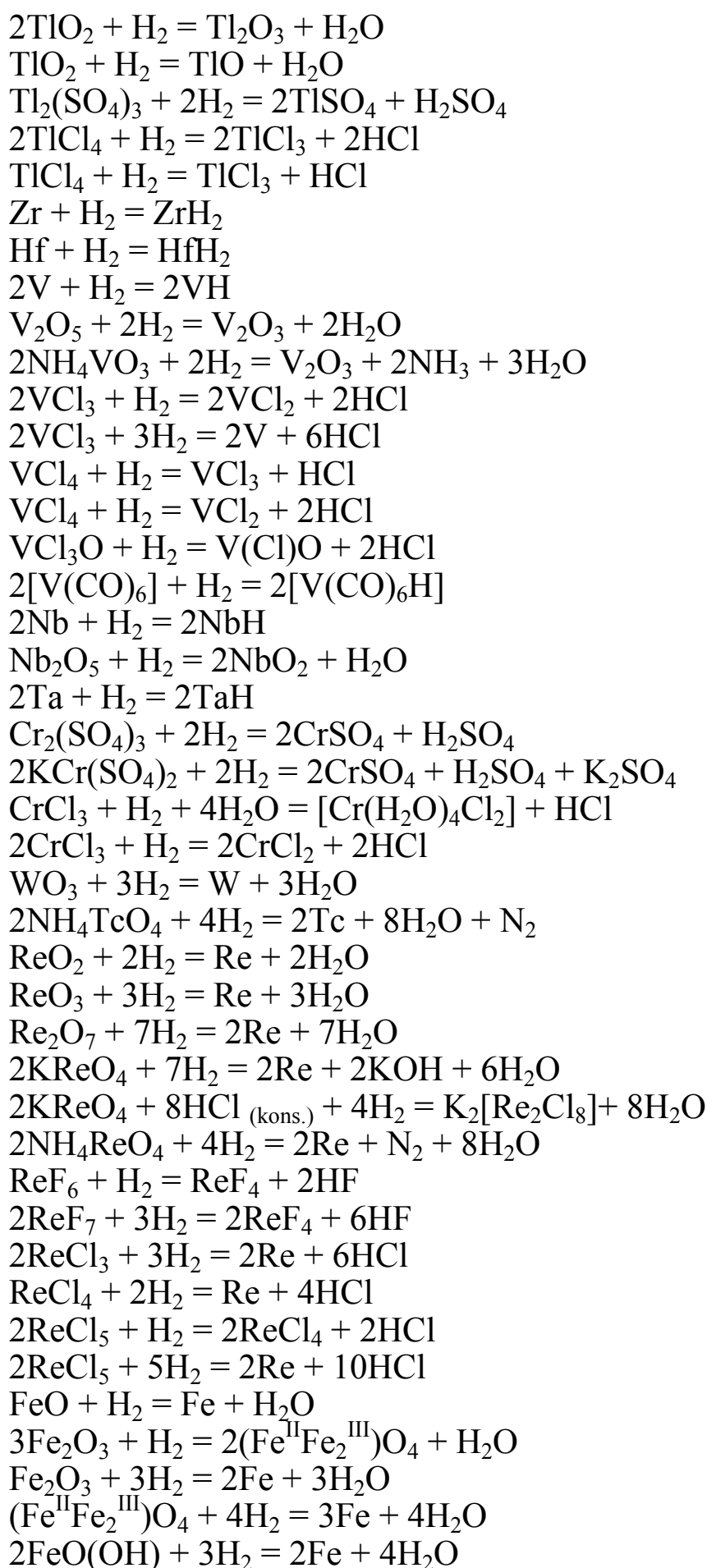
Kimyoviy xossalari:

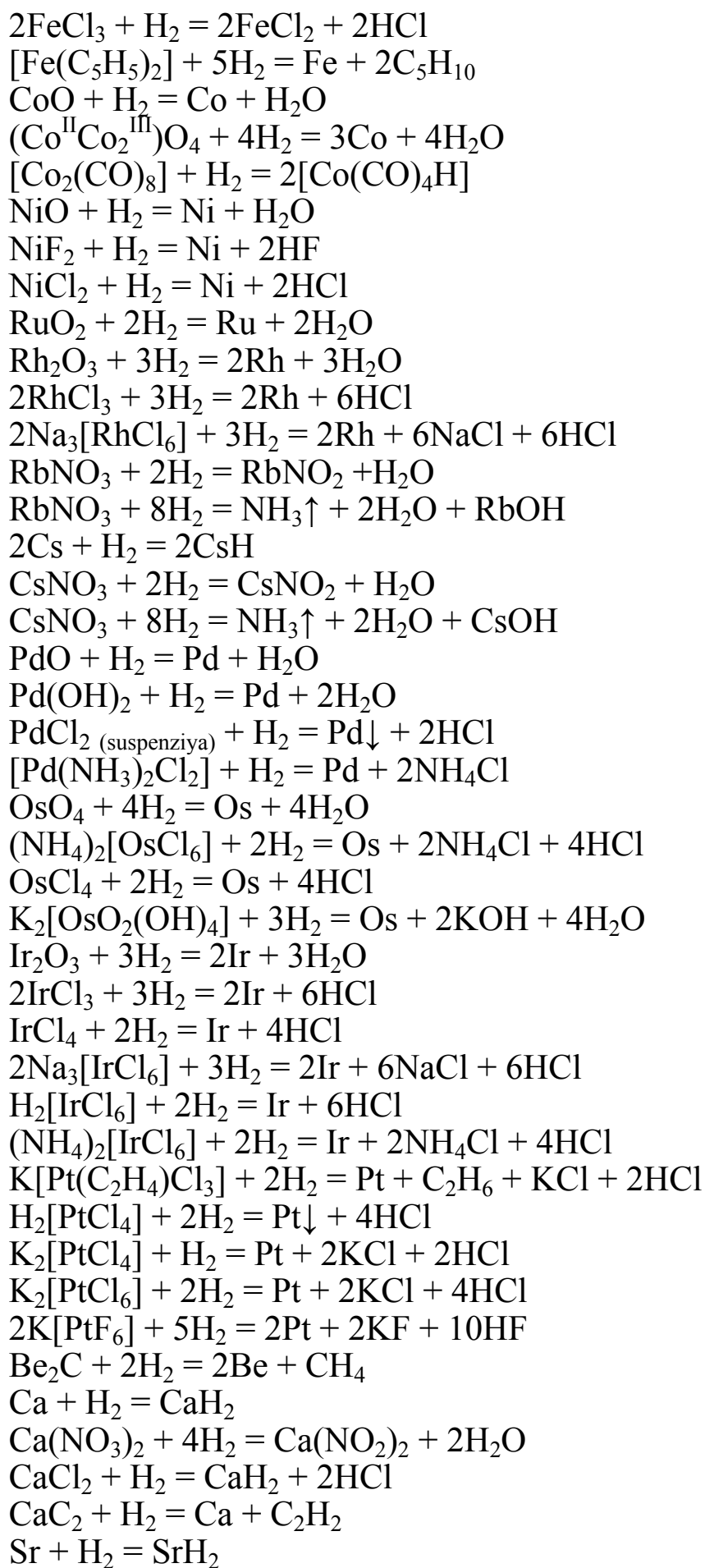


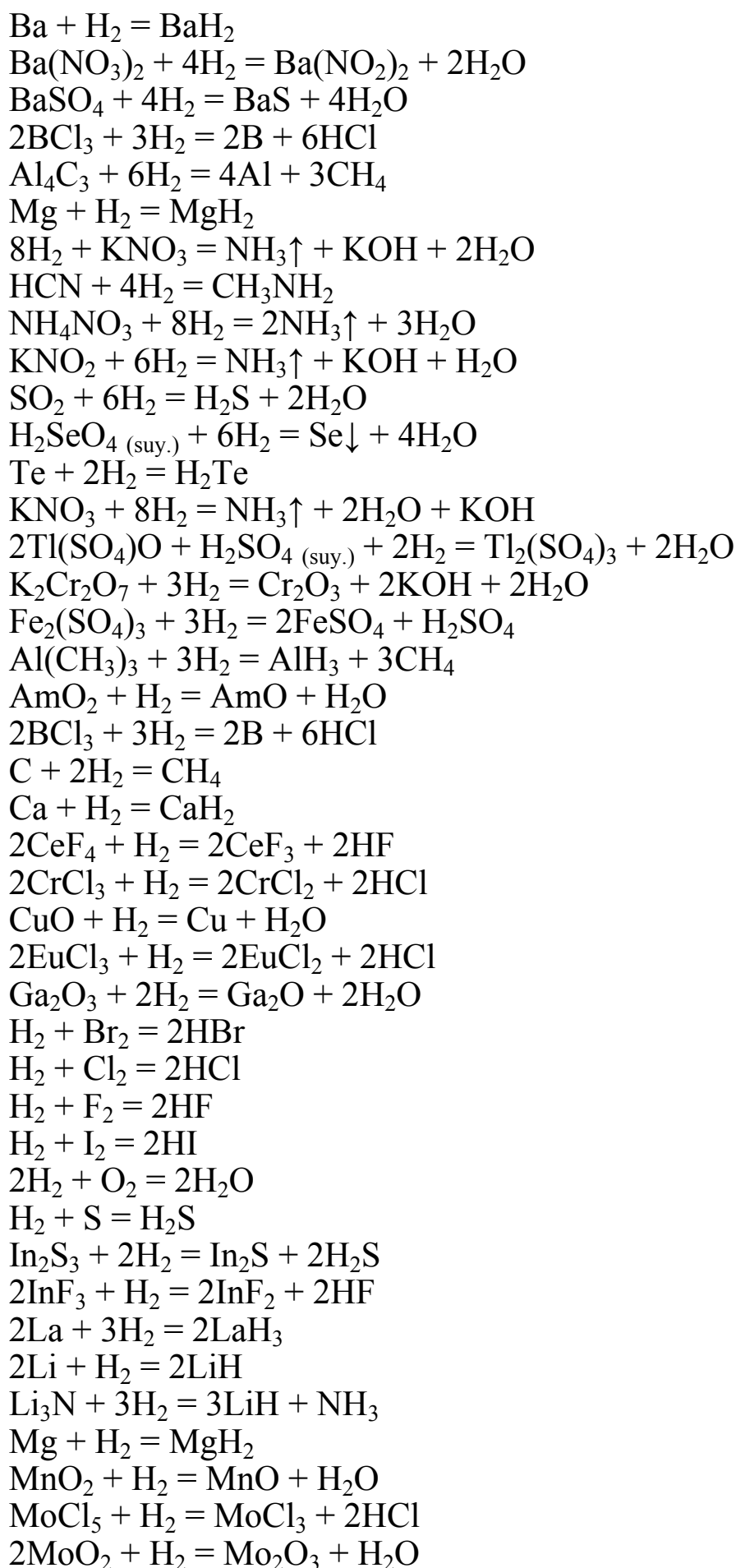


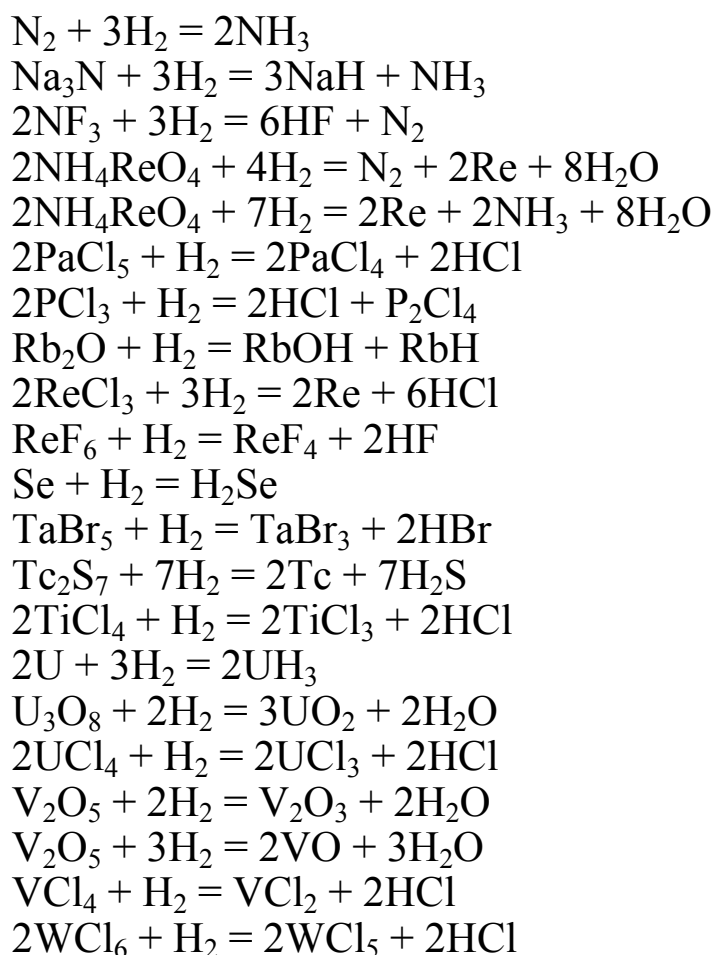












Litiy - Li

LITIY: belgisi - Li. Litiy 1817-yilda A.Arffvedson tomonidan alyuminosilikat holdagi mineral tarkibidan ajratib olingan va ilk bora kashf etilgan. Litiy 1818-yil Devi va Brandelar tomonidan elektroliz usulida yanada sof holda olingan. Litiy faol metall bo‘lgani uchun tabiatda faqat birikmalar holda uchraydi. Litiy erkin holda juda yengil, hatto benzinda ham cho‘kmaydigan kumushsimon oq metall.

Ishqoriy metallar guruhiga mansub kimyoviy element, (lot. Lithium), (yunon. lithos- tosh), tartib raqami 3, atom massasi 6,941; zichligi 0,536 g/sm³ (metallar ichida eng yengili), $t_{\text{suyuq}}=180,5^{\circ}\text{C}$, $t_{\text{qayn}}=1370^{\circ}\text{C}$. Litiy juda faol metall. 1855-yilda esa taniqli olimlar Binzen va Mattesen litiy xloridini elektr toki yordamida elektroliz usuli bilan sof litiy metallini olishni sanoat miqyosida tatbiq qilishni taklif etdi. Litiyning bugungi kungacha 150 dan ortiq turli minerallari ma’lum. Biroq asosan, sanoatda va ishlab chiqarishda uning 5-6 ta minerallari litiy ajratib olish uchun asosiy xomashyo manbai bo‘lib xizmat qiladi. Ular sinivaldit, petalit, ambligokit va boshqalardir.

Minerallari. Asosiy minerallari quyidagilar hisoblanadi:

alyumosilikatli mineral – $\text{LiAl}[\text{Si}_2\text{O}_6]$ (spodumen):

fosfatli mineral – $\text{LiAl}(\text{PO}_4)\text{F}$ (ambligonit).

Litiy ko‘pchilik minerallarda, mineral suvlarda, hatto tirik organizmlarda uchraydi. Uning eng muhim minerallari

lepidolit - $\text{Li}_{1,5}[\text{Si}_3\text{AlO}_{10}](\text{FOH})_2$

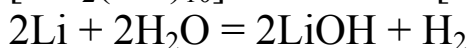
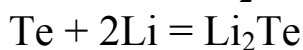
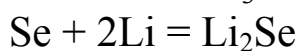
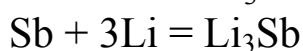
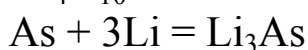
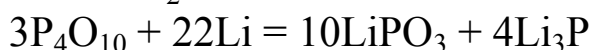
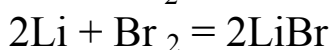
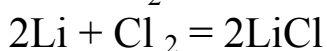
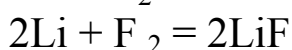
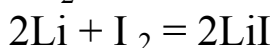
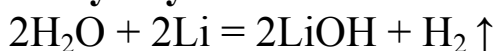
Ishlatilishi. Yadro energetikasida litiy keng qo‘llaniladi. ^6Li izotopi – tritiy olish uchun yagona sanoat manbai. Litiy yadro reaktorlarining rostlovchi sterjenlarini tayyorlash uchun ishlatiladi. Qotishmalarni oksidsizlantirish, legirlash va modifikatsiyalashda ishlatiladi, rangli metallurgiyada – metallning mexanik xossalarini yaxshilashda qo‘llaniladi. Litiy birikmalari maxsus oyna, issiqqa chidamli chinni, sopol, shuningdek, plastik moylar olishda ishlatiladi.

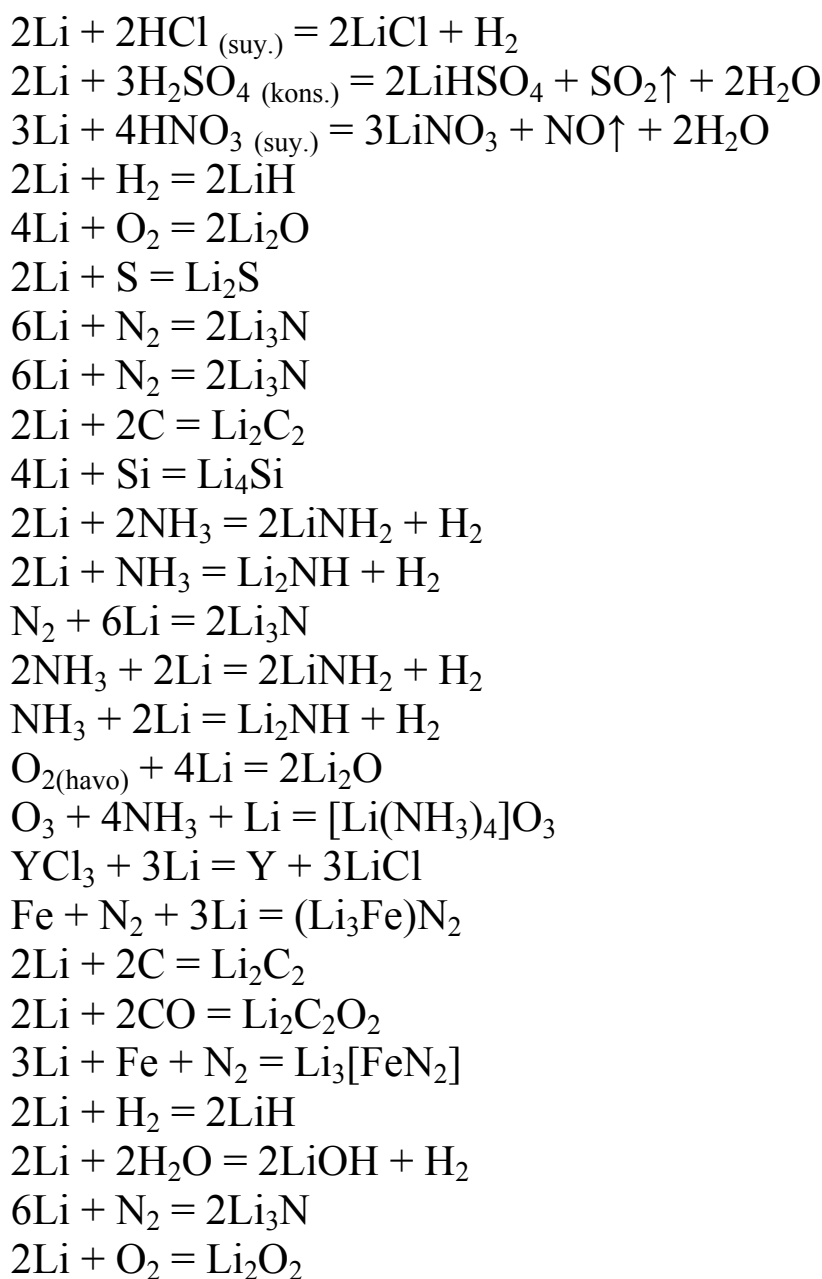
Qotishmalari. Litiyning quyidagi qotishmalari mavjud:

Al-Li-Cd; Al-Li-Be.

Olinishi. Litiyli ruda tarkibida 0,5% dan yuqori litiy bo‘lsa, ularni qayta ishlash iqtisodiy samara beradi. Termik boyitish, qo‘lda saralash, separatsiya, magnitli boyitish va flotatsiya usullari bilan boyitish mumkin. Boyitmalarni qayta ishlashda sulfatli usul (unda avvaliga kaliy sulfat qo‘shilib, so‘ng $920-1050^\circ\text{C}$ da qumoq olinib, tanlab eritiladi), ohakli usul (unda $1150-1200^\circ\text{C}$ da ohaktosh qo‘shilib, qumoq olinadi va maydalanib tanlab eritiladi), sulfat kislotali usul (unda sulfat kislota yordamida qayta ishlanib, boyitiladi so‘ng eritiladi). Olingan Li_2CO_3 xlorid kislotada eritiladi va LiCl olinadi. U quritilgach, havo kirmas qutichalarga joylashtirilib, sotuvga chiqariladi.

Kimyoviy xossalari:





Berilliy - Be

BERILLIY:belgisi - **Be**. 1798-yilda taniqli fransuz kimyogari L.Voklen tomonidan yarim noyob berill minerali tarkibidan berilliy olingan, oradan 30 yil o'tgach, Germaniyada F.Vyoler, Fransiyada E.Byussilar ilgari ajratib olinganga nisbatan toza berilliy ni kukun ko'rinishida mustaqil olishdi. Kimyoviy element, Be (lot.Berillium), tartib raqami 4, atom massasi 9,01218. Berilliy yengil, och kulrang metall; zichligi 1,848 g/sm³, t_{suyuq}=1287⁰C, t_{qayn}=2450⁰C.

Berilliylash – po‘lat yoki boshqa qotishmalar (asosan, issiqbardosh) ni berilliy bilan diffuzion to‘yintirish. Berilliy olish natijasida po‘latning

qattiqligi, 800-1100⁰C da issiqbardosh va korroziyaga bardoshligi oshadi. Berilliy kunksimon aralashmalarda yoki gaz muhitida o'tkaziladi.

Minerallari. Yer kurrasida berilliyning o'rtacha tarkibi $6 \cdot 10^{-4}$ (og'irligi bo'yicha) ni tashkil qiladi. 40 taga yaqin berilliy minerallari mavjud. Sanoat miqyosida ahamiyatga ega minerallari: berill, xrizoberill, fenakit, gelvit, bertrandit vadanalitlardir. Berilliy minerali berilliy tarkibida $Be_3Al_2(Si_6O_{18})$ 14,1% BeO ko'pincha ishqoriy metallar qo'shimchasi bilan bo'ladi.

Ishlatilishi. Berilliy samolyotsozlik, elektrotexnikada ishlatiladigan Aluminiy, magniy, mis qotishmalari tarkibiga kiradi. Berilliy yadro texnikasida konstruksion material (neytronlarni susaytiruvchi va qaytaruvchi) bo'lib xizmat qiladi; radiy, poloniy, aktiniy va boshqa (α = zarrachalar bilan bombardimon qilinganda neytronlarni intensiv nurlatadigan) neytron manbalarida qo'llaniladi. Rentgen nurlari o'tkazuvchanligi yuqoriligi tufayli berilliydan rentgen trubkalarining darchalari tayyorlanadi.

Qotishmalari – berilliy asosidagi qotishmalar. Asosiy afzalliklari 600-800⁰C haroratgacha solishtirma mustahkamligi va solishtirma birligining yuqoriligi hamda neytronlarni qamrash, ko'ndalang kesimining kichikligidir; asosiy kamchiliklari esa xona va kriogen (120⁰C dan past) haroratlari pastligi bo'lsa, zaharliligi berilliy qotishmasidan tayyorlanadigan buyumlar va yarim fabrikatlar, asosan, kukun metallurgiyasi usullari bilan kamdan-kam hollarda quyish usuli bilan olinadi. Berilliy qotishmasidan yadro energetikasi, kosmonavtika, aviatsiya, kemasozlik va boshqa sohalarda foydalaniladi.

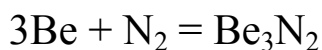
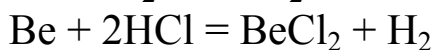
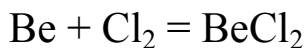
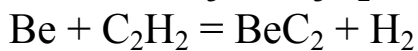
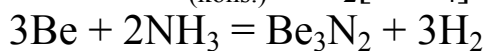
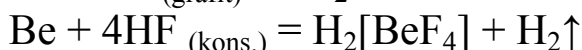
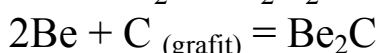
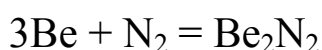
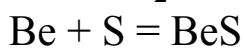
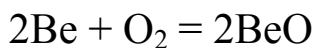
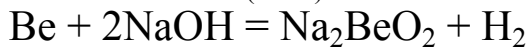
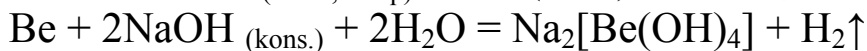
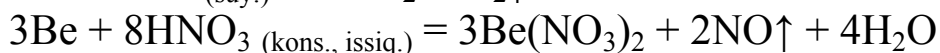
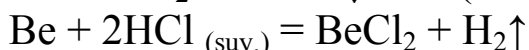
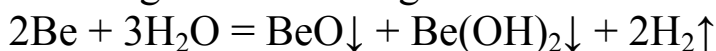
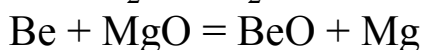
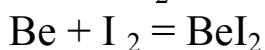
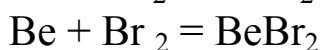
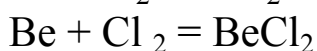
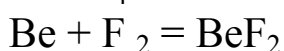
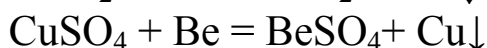
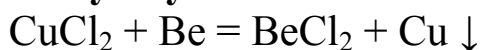
Olinishi. Berilliyli rudalar asosiy metallga juda kambag'al bo'lib, 0,03% dan 2% BeO holida tabiatda uchraydi. Berilliy 3 ta usul orqali boyitiladi.

1. Qo'lda saralash. Unda radioaktivligiga qarab avtomatik usulda va radiometrik usulda berilliy keraksiz tog' jinslaridan saralanadi.
2. Tanlab maydalash. Qachonki, konda tog' jinslari yumshoq minerallar tarkibida bo'lsa, bu usul qattiq berilliy minerallarini saralashda yaxshi natija beradi.
3. Flotatsiya. Bu usul berilliy qonunida mayda zarrachalar holida uchrab, qo'llaniladi.

Olingan boyitma tarkibida BeO 6% dan 12% gacha bo'ladi. Sanoatda sulfatli va fluoridli usullar orqali berilliy boyitmasi qayta ishlanib, berilliy

ftoridi va xloridi olinadi. Sulfatli usulda 1500-1600⁰C da elektrli pechda ohaktosh yordamida boyitma eritilib, eritma suvi granulalanadi, so‘ng maydalanib, sulfat kislotasida eritiladi. Sulfatlashtirish va tanlab eritish, tozalashdan so‘ng berilliy gidroksidida olinadi. Tozalangan toza BeO olish mumkin, biroq sof berilliy metall holida olish uchun BeO asosiy xomashyo manbai bo‘la olmaydi. Berilliy ftoridi magniy yordamida qaytariladi yoki elektrolit xloriddan elektroliz orqali sof berilliy metall holida olinadi.

Kimyoviy xossalari:



Bor – B

BOR: belgisi - **B**. 1808-yilda taniqli fransuz kimyogarlari J. Gey-Lyussak va L.Tenar bor kislotasidan bor elementini topishdi. Lekin olingan moddaning tarkibida borning miqdori 70% dan oshmagan. Faqat oradan 101 yil o‘tgandan keyin amerika kimyogari E.Veyntraub

tomonidan 99% li bor kimyoviy elementi sof holda olindi. Davriy sistemaning III guruh kimyoviy elementi, (arabcha “Buqag” soʻzidan olingan), tartib raqami 5, atom massasi 10,81. Borning kristall va amorf shakl oʻzgarishlari bor; amorf bor qoʻngʻir kukun, zichligi $2,34 \text{ g/sm}^3$, $t_{\text{suyuq}} = 2075^{\circ}\text{C}$ - 2180°C , $t_{\text{qayn}} = 3707^{\circ}\text{C}$; kristall bor qattiqligi jihatidan olmosga yaqinlashib boradi; elektr tokini oʻtkazadi, tabiatda uchraydigan birikmalari: borat kislota - H_3BO_3 va bura - $\text{H}_2\text{B}_4\text{O}_7$ kulrang qora rangli

Minerallari.

Sassolin - $\text{B}(\text{OH})_3$;

Yeremeyevit - AlBO_3 ;

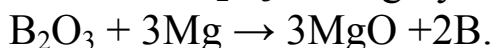
Asharit - MgHBO_3

Tabiatda asosan borat kislotasi tuzlari (boratlar) koʻrinishida uchraydi; ulardan eng avval maʼlumi - bura (tuz - $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$). Boratlarni parchalab bor angidridi B_2O_3 olinadi; B_2O_3 ni magniy bilan qaytarib bor hosil qilinadi.

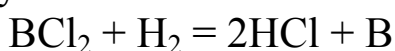
Ishlatilishi. Bor xloridi va bor vodorodlarni qaytarib yoki termik parchalab, oʻta toza bor qoʻshiladi. Texnikada borlar (borning metall bilan birikmasi) keng qoʻllaniladi. Bor hamda uning nitridi, karbiti va boshqa birikmalari yarim oʻtkazgich materiallardir. Bor birikmalari (masalan, borat kislota) tibbiyotda va qishloq xoʻjaligida mikrooʻgʻit sifatida ishlatiladi. Borning tabiiy izotoplaridan biri ^{10}B issiqlik neytronlarini keng qamrash xossasidan muhofaza materiallari, yadro reaktorlari va neytron schetchiklarining rostlovchi sterjenlarini yasashda

Qotishmalari. Poʻlat metall bilan borning aralashmasi qattiq poʻlatga aylanadi. Sanoatda Pf-1 markasi bor.

Olinishi. Borni boshqa elementlardan ajratish uchun bornometil efirini $\text{B}(\text{OCH}_3)_2$ kislota eritmalaridan haydash (vozgon) bilan olinadi. Bor tabiatda birikmalar holida uchraydi. Sanoat usulida B_2O_3 oksidining qaytarilish reaksiyasi yuqori haroratda oʻtkaziladi, natijada amorfli bor olinadi. Bor oksidli birikmalarini qayta ishlash texnologiyasi orqali bor olinadi. Toza boʻlmagan borni birinchi boʻlib, Gey-Lyussak va Tenarlar 1808-yilda bor angidridini yuqori haroratda qalay bilan qaytarib olganlar. Hozirgi kunda bor asosan metallotermiya usuli bilan olinadi. Bor sanoatda uch oksidi bor B_2O_3 ni magniy termik qaytarish orqali olinadi:

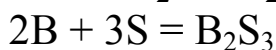
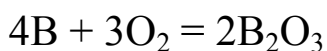
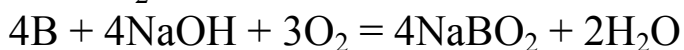
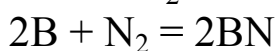
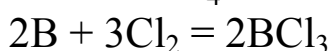
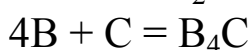
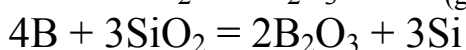
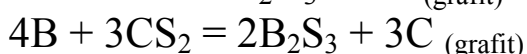
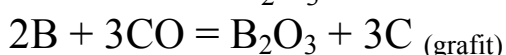
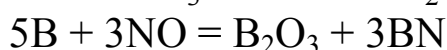
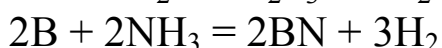
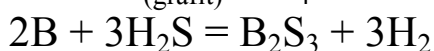
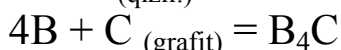
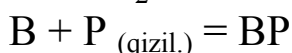
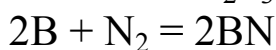
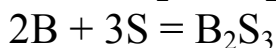
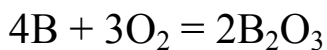
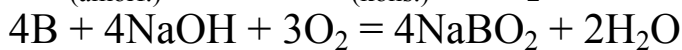
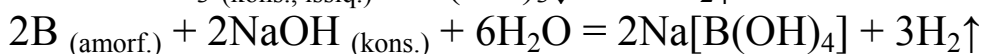
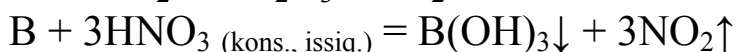
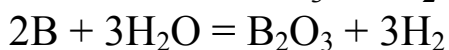
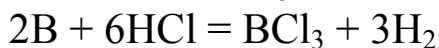
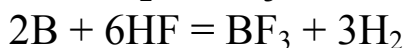
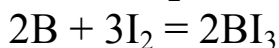
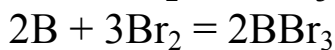
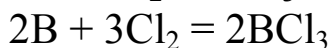
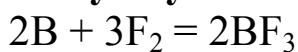


Reaksiya 2000C yuqori haroratda oʻtkazilib, amorf holatida olinadi. Kristall bor oʻz galogenidlarini vodorod bilan qaytarib, erkin ajraydi.



Bor oksidli birikmalarini qaytarish reaksiyasi asosida texnologik jarayon olib boriladi.

Kimyoviy xossalari:



Uglerod - C

Uglerod: belgisi - C, juda qadim zamonlardan ma'lum, Mendelejev davriy sistemasining IV guruh kimyoviy elementi, C (Carbonium), lotincha ko'mir so'zidan olingan, tartib raqami 6, atom massasi 12,011; 120 atm. bosimda $t_{\text{suyuq}}=4000^{\circ}\text{C}$; $t_{\text{qayn}}=4200^{\circ}\text{C}$.

Erkin holatdagi uglerod olmos va grafitdir. Uglerod karbin deb ataluvchi yana bitta allotropik shaklga ega bo'lib, tabiatda juda kam

uchraydi. Uglerodning sodda birikmalari (karbonat anhidrid, metan) quyosh sistemasining deyarli hamma planetalari atmosferasida topilgan (masalan, Mars atmosferasida uglerod, asosan, karbonat anhidrididan tashkil topgan). Barcha o'simlik va hayvon organizmi uglerod birikmalaridan iborat (o'rtacha massa bo'yicha uglerod 18% ni tashkil etadi).

Uglerodlash.

1) Suyuq po'latga yetishmagan uglerodning tarkibida uglerod bo'lgan materiallar (qattiq yoki suyuq cho'yan, koks, antratsit, pista ko'mir va boshqalar) kiritib, me'yorga yetkazish.

2) Marten pechi shixtasiga uglerod yetishmaganda unga uglerodli moddalar kiritish. 3) Po'lat buyumlarning qattiqligi va yeyilishiga chidamliligini oshirish uchun sirtqi qatlamini uglerodga to'yintirish.

Uglerodli po'lat – tarkibida 0,04 – 2% uglerod va doimiy qo'shimchalar (1% gacha oltingugurt, 0,009% gacha fosfor) bo'lgan legirlanmagan po'lat; bu qo'shimchalar po'lat ishlab chiqarish sharoitlari bilan bog'liq holda ishtirok etadi. Tarkibidagi uglerod miqdoriga ko'ra, past uglerodli (C 0,25% gacha), o'rtacha uglerodli (C 0,25 - 0,6%) va yuqori uglerodli (C 0,6% dan ortiq) xillarga bo'linadi. Uglerodli po'lat qora metallurgiyaning asosiy qismini tashkil etib, turli konstruksiyalar va asbobsozlikda keng qo'llaniladi.

Minerallari. Olmos kristalidagi hamma uglerod atomlari o'zaro juda mustahkam bog'langan va fazoda uzluksiz uch yo'lovchi karkas hosil qiladi. Grafitdagi uglerod atomlari parallel qatlamlarda joylashgan; bunda qatlam ichidagi atomlarning o'zaro bog'lanishi qatlamlararo bog'lanishga nisbatan kuchliroq bo'ladi. Uglerodning asosiy minerallari – karbonatlar. Uglerodning asosiy miqdori ko'mir, neft, torf, tabiiy yonuvchi gazlar tarkibida bo'ladi, karbonat anhidrid CO_2 ko'rinishida yer atmosferasi tarkibiga (0,03% ulushi) kiradi.

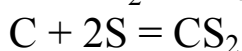
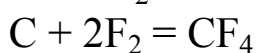
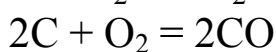
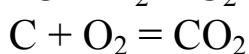
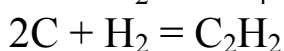
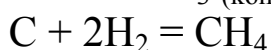
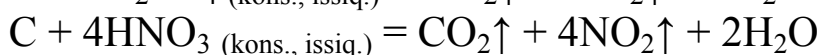
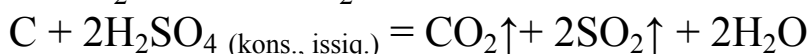
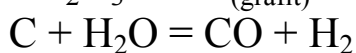
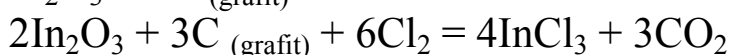
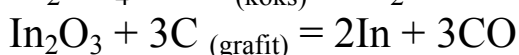
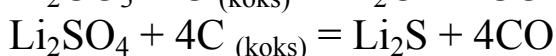
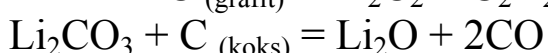
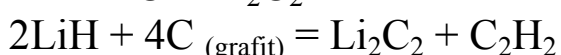
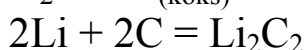
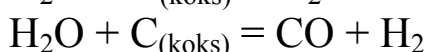
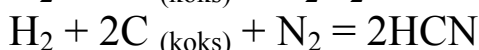
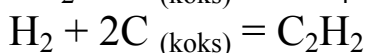
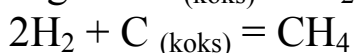
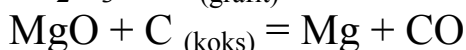
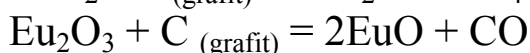
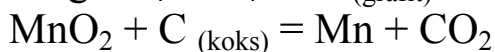
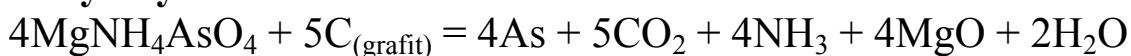
Ishlatilishi. Uglerod metallurgiya sohasida yoqilg'isifatida keng qo'llaniladi. Olmos dielektrik, grafit esa elektr tokini yaxshi o'tkazadi. Olmos kimyoviy jihatdan turg'un, grafit esa reaksiyaga anchagina moyil. Olmos va grafit, asosan, tabiiy xomashyoni qayta ishlab olinadi. Sanoatda tarkibi bo'yicha toza uglerodga yaqin bo'lgan mahsulotlar: koks, qurum, pistako'mir, faol ko'mir ishlab chiqarilmoqda. Uglerod birikmalari organik kimyoda batafsil o'rganiladi.

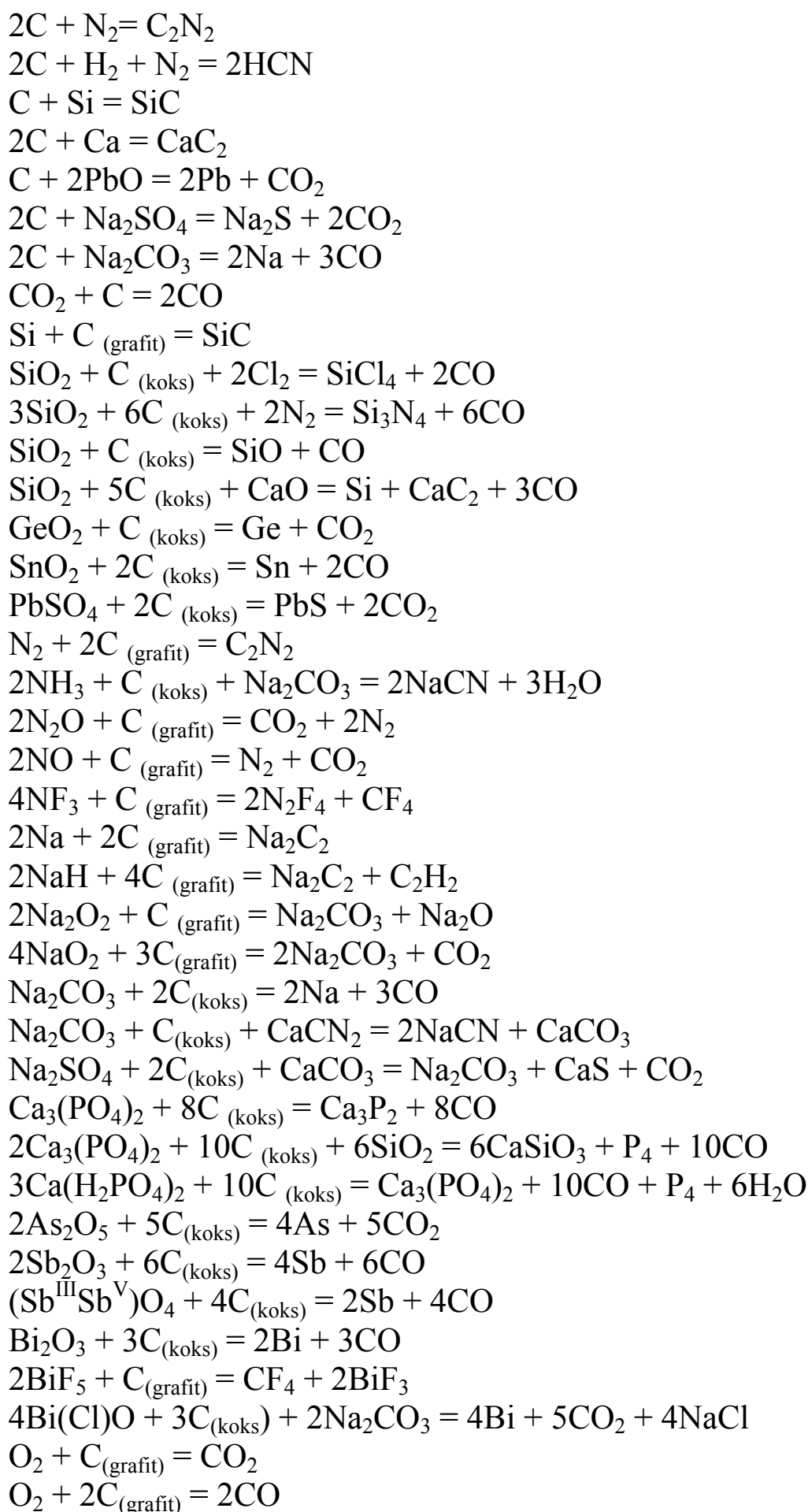
Qotishmalari. Olmos va grafit minerallari sanoat usulida yuqori harorat 1500°C , bosim va katalizatorlar temir, nikellar ishtirokida sof uglerod kristall holida ajratib olinadi. Jumladan, sun'iy uglerod ham

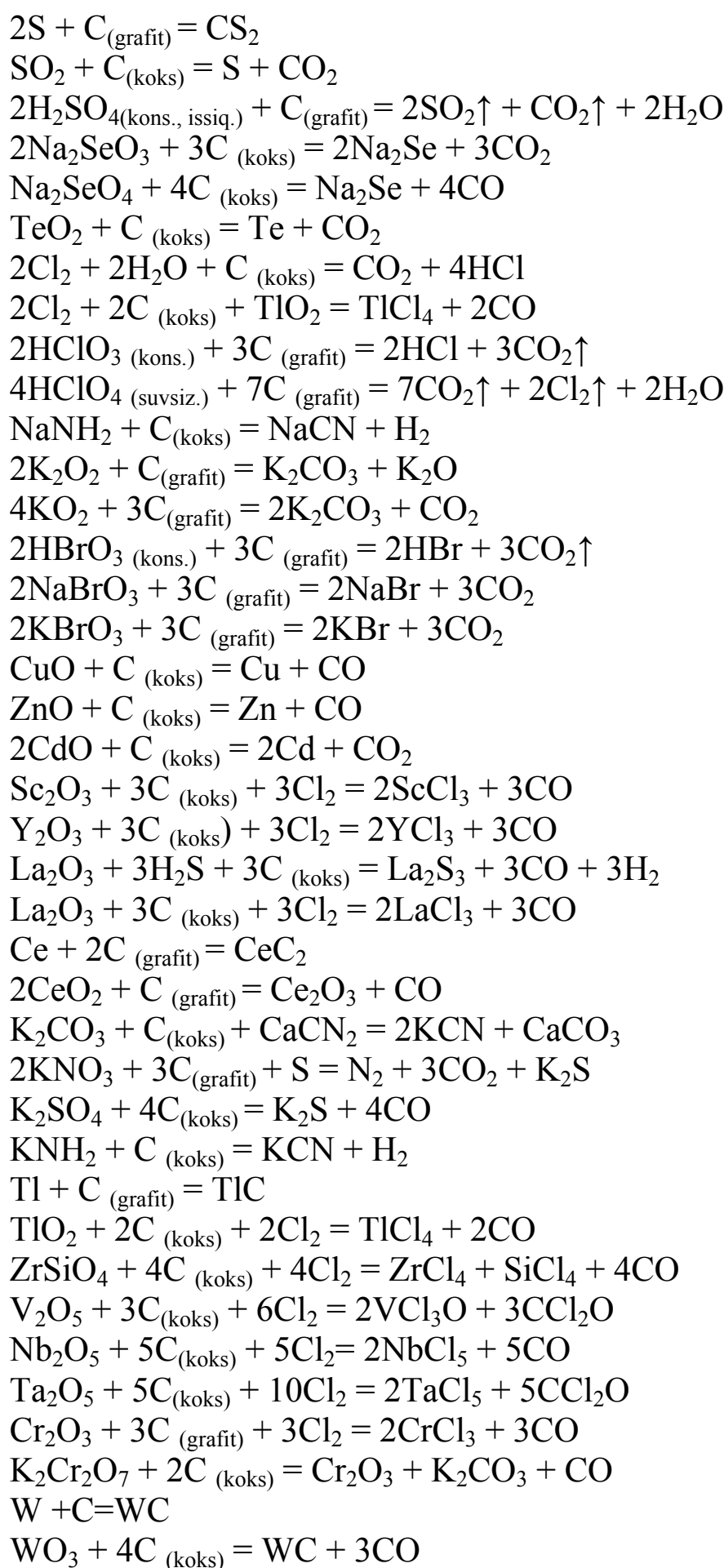
yuqori bosim, haroratda sintez qilinadi. CO₂ - karbonat anhidrid, CCl₄ - karbon (IV) - xlorid, CBr₄ - karbon (IV) - bromid, Cl₄ - karbon (IV) - yodid, CF₄ - karbon (IV) - ftorid, H₄C₂O₆ - perkarbonat kislotalar.

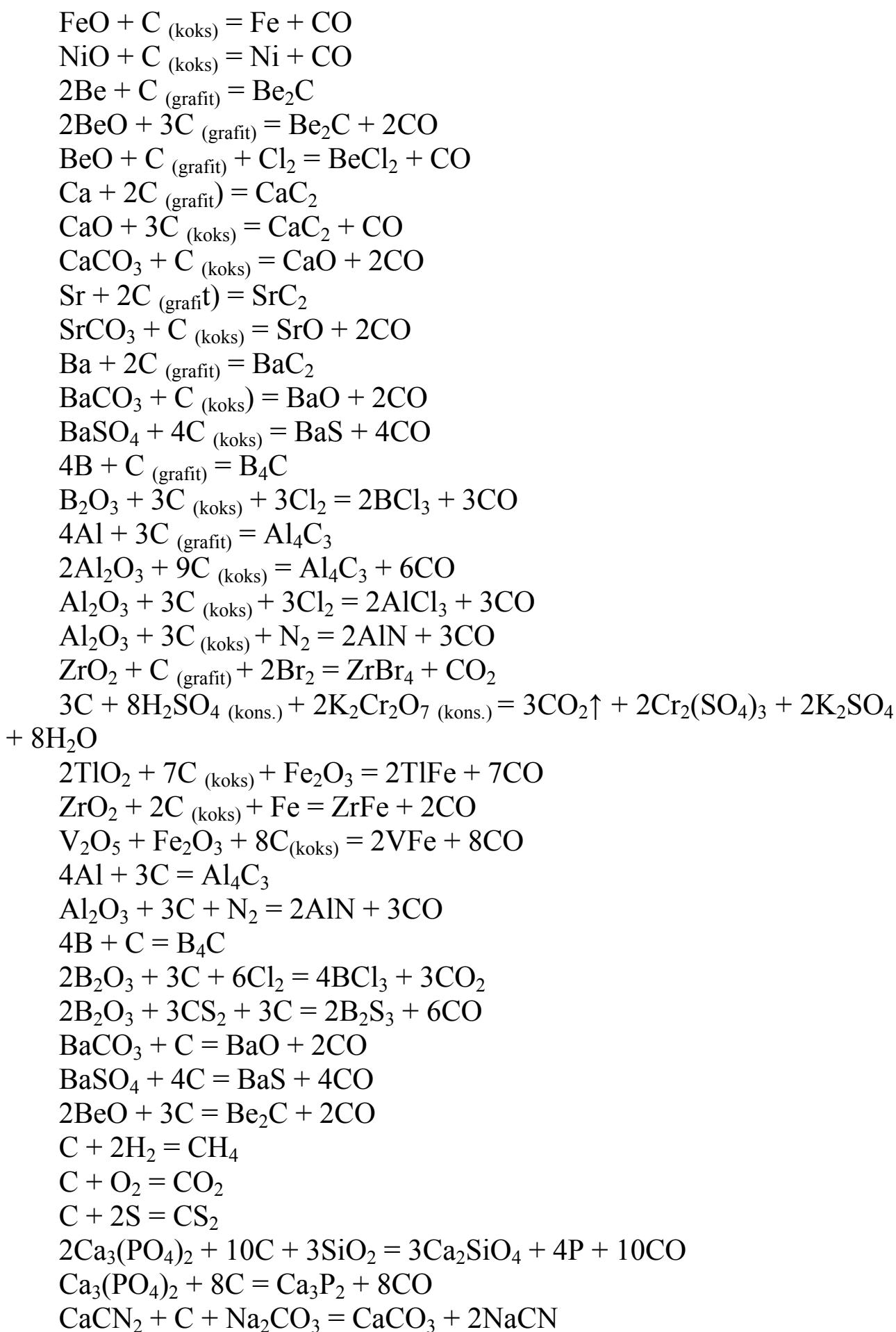
Olinishi. Koks kimyosida uglerod ko‘mir shaklida ishlatiladi va kul sifatida qattiq tashlandiq holda bo‘ladi. Shuningdek, erkin holda uglerod uch xil allotropik shaklda uchraydi: olmos, grafit, karbin. Olmos sanoat miqyosida grafitdan sun‘iy yo‘l bilan olinadi. Bu jarayon yuqori harorat (2000-4000⁰C), katta bosim (60-120 ming atm) va metall katalizatorlar Ni, Co, Mo, Fe da boradi. Bunda koks va qumdan tayyorlangan bo‘tqasimon aralashma elektr pechda 1-2 sutka 2200-2800⁰C da qizdiriladi.

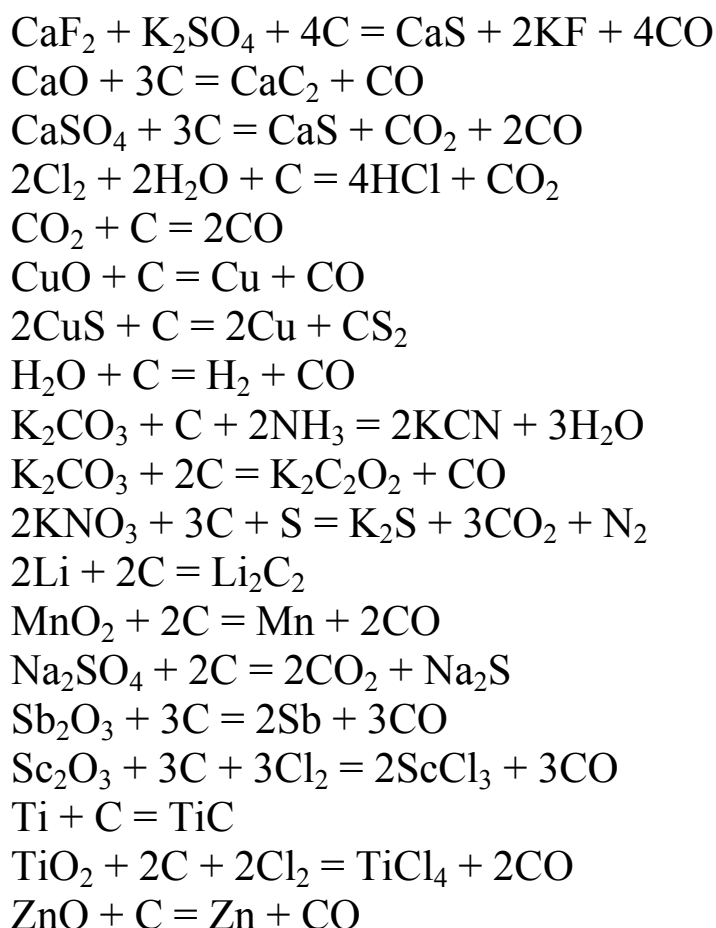
kimyoviy xossalari:











AZOT – N

AZOT: belgisi - N. XVIII asr oxirlarida fransuz kimyogari A.Lavuaze “azot” soʻzini taklif qildi, “azote” - yunon tilida “hayotsiz” degan maʼnoni bildiradi, (“a” - inkor qilish qoʻshimchasi, “zote”-hayot); Azot lotinchada nitrogenium -“selitra tugʻdiruvchi” demakdir.

Azot 1772-yilda D.Rezerford tomonidan kashf etilgan. Tartib raqami 7, atom massasi 14,0067. Azot rangsiz va hidsiz gaz; zichligi $1,25 \text{ g/sm}^3$; $t_{\text{suyuq}} = -210^{\circ}\text{C}$, $t_{\text{qayn}} = -196^{\circ}\text{C}$.

Havoning asosiy tarkibiy qismi (hajm boʻyicha 78%) ni tashkil etadi. Azot nafas olishga yordam bermaydi (nomi shundan); tirik toʻqimalarning muhim moddalari (oqsil va nuklein kislotalar) tarkibiga kiradi; oʻsimliklar ozigʻining asosiy elementlaridan biri.

Azotlash, nitridlash - titan va poʻlat buyumlar sirtqi (0,2–0,8mm) qatlamini azot bilan diffuzion toʻyintirish. Poʻlatni azot ammiak muhitida, shuningdek, karbamid va sianid asosidagi tuzlar eritmasida (suyuq azot) $500\text{--}650^{\circ}\text{C}$ haroratda oʻtkaziladi, natijada qattiqlik, yeyilishga chidamlilik, korroziya bardoshlik (havoda va suvda), toliqishga qarshiligi ortadi.

Azotli o'g'itlar – o'simliklarni azot bilan oziqlantirish manbai sifatida foydalaniladigan mineral va organik moddalar. Azotning o'simliklarni azotdan tashqari boshqa elementlar bilan oziqlantiradigan organik (go'ng, torf, kompost) sanoatda ishlab chiqariladigan mineral (ammoniy sulfat, ammoniy xlorid, ammiakli selitra, natriyli selitra, karbamid va boshqa) va ko'p (lyupin, seradella va boshqa) xillari bor. Azotli o'g'itlar, ayniqsa, azot miqdori kam bo'lgan o'rmon - qir namlik hududlarda va dehqonchilikda sug'oriladigan, noqoratuproq hududlarda, qishloq xo'jaligi ekinlari hosildorligini oshirishda samarali vosita hisoblanadi. Azotli o'g'itlar berish me'yori tuproq sharoitiga, ekinlarning biologik xususiyatlariga va boshqa sabablarga bog'liq; ular 30-150kg (azotga aylantirib hisoblanganda) miqdorida beriladi.

Minerallari. Chili, Norvegiya selitralari holda tabiatda uchraydi.

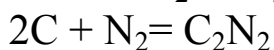
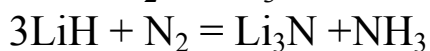
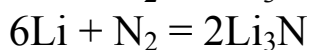
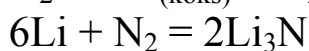
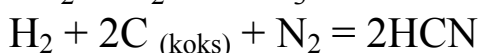
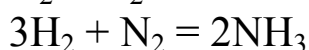
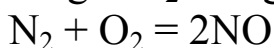
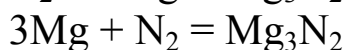
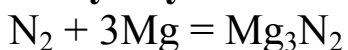
Ishlatilishi. Azot sovutish qurilmasi sifatida ishlatiladi. Azot sanoatda jumladan, 500-600⁰C gacha haroratda ishlaydigan detallar (silindrlargilzasi, tirsakli val, dvigatellarning yoqilg'ibilan ta'minlash qismlari) uchun keng qo'llaniladi.

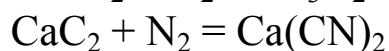
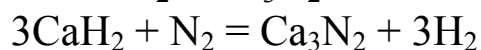
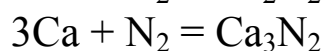
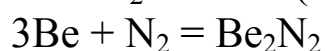
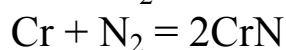
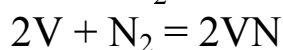
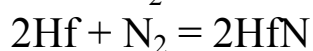
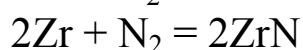
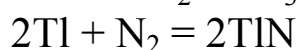
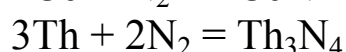
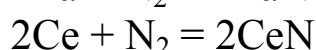
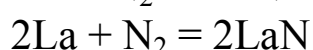
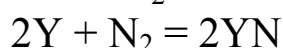
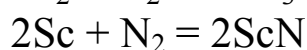
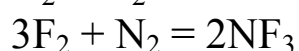
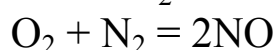
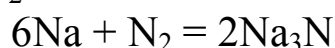
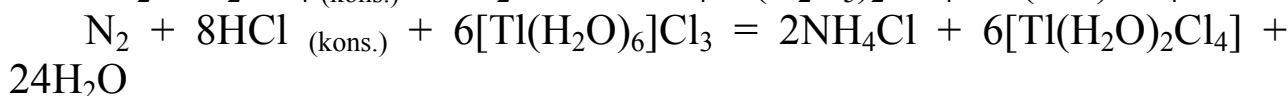
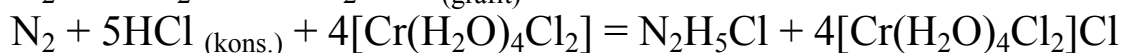
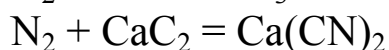
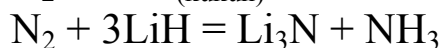
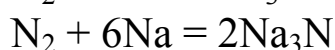
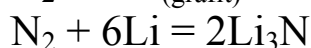
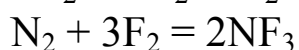
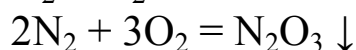
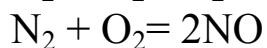
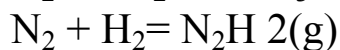
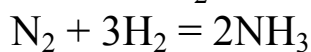
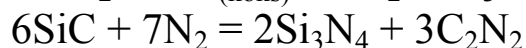
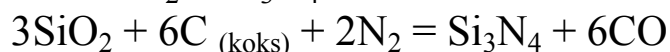
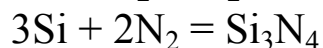
Qotishmalari. Azot (III) - yodid -NI₃, Azot (III) - ftorid - NF₃,

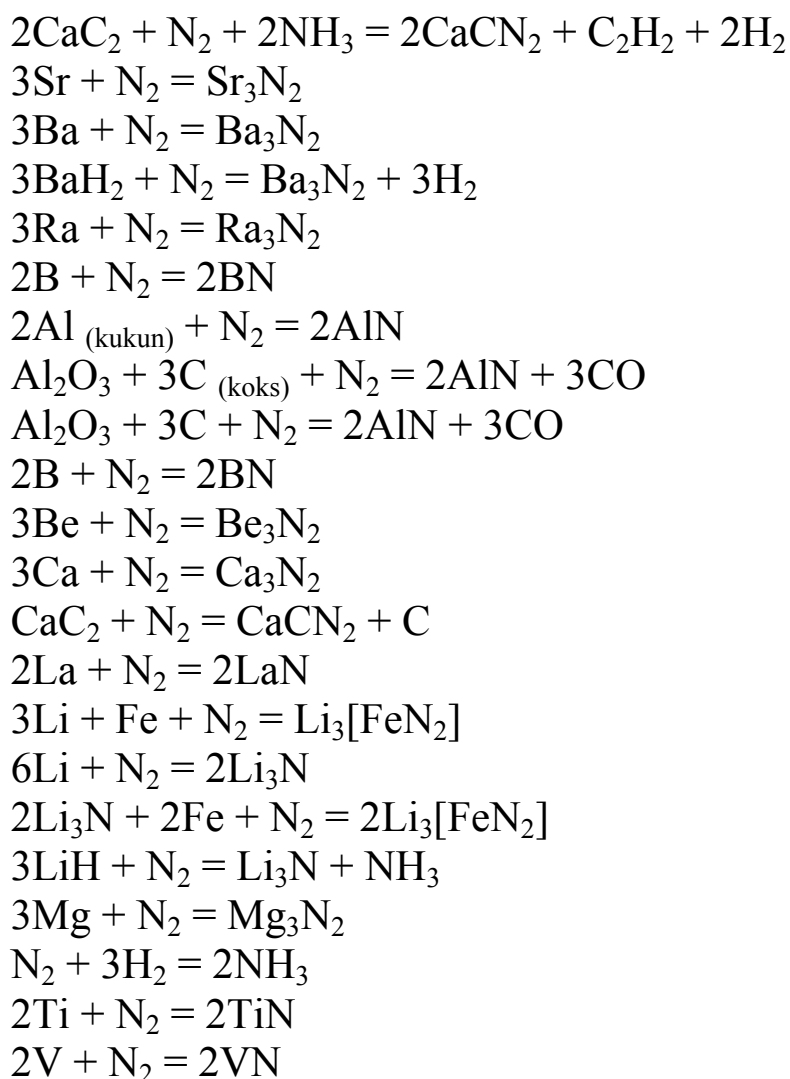
Azot (III) – xlorid - NCl₃, Azot (IV) - oksidi - NO₂, Azot (I) oksidi- N₂O.

Olinishi. Azot havoni suyultirish, keyin ajratish yo'li bilan olinadi. Mineral o'g'itlar ishlab chiqarish texnologiyalarida monomer sifatida ishlatiladi va havo tarkibidan erkin holda olinadi. Shuningdek, azot sanoatda asosan havodan olinadi. Havodan azotni olish uchun, avvalo, havoni quritib namligi yo'qotiladi. Karbonat angidrid esa kalsiy gidroksid eritmasiga yoki ishqor eritmasiga yuttiriladi. Shu tariqa tozalangan havo sovutilib, suyuq holga keltiriladi, so'ngra suyuq havoni bug'lantirib, azotoksigidan ajratiladi.

Kimyoviy xossalari:







KISLOROD – O₂

KISLOROD: belgisi - O. Kislorod yer yuzida eng ko‘p tarqalgan element. Toza holdagi kislorodni dastavval 1772-yilda shved kimyogari Sheele, undan keyin esa 1774-yilda Pristli ajratib olishgan.

Tabiatda ham, inson amaliy faoliyatida ham muhim ahamiyatga ega kimyoviy element, O (lot. Oxygenium), tartib raqami 8, atom massasi 15,9994.

Normal sharoitda kislorod rangsiz, hidsiz va ta'msiz gaz. Kislorod birikmasi yer qobig‘idagi suv massasining taxminan 8/9 qismini (gidrosferalar), yer qobig‘ining taxminan yarmini tashkil etadi va faqat atmosferada (erkin holatda), azot (massasi jihatdan 21,15% qismini tashkil etadi) dan keyin 2-o‘rinda turadi. Tirik organizmlarda o‘rtacha hisobda taxminan 70% kislorod massasi bor.

Yerdagi erkin kislorodlarning barcha massasi fotosintez jarayonida kislorod ajratib chiqaradigan hayot faoliyatidan hosil bo'lgan va saqlanmoqda. Turli moddalarning kislorod bilan oksidlanishi hayvonlar va o'simliklarning hayot faoliyatlari uchun kerakli energiya manbaidir.

Insonning xo'jalik faoliyati kislorodning yerda aylanib yurishini o'zgartiradi; masalan, yoqilg'ilarning yonishi uchun dunyoda har yili 9 Gt ($9 \cdot 10^9$ t) kislorod sarf bo'ladi. Odatdagi sharoitda kislorod molekulasida ikki atomli (O_2); sokin elektr razryadda ozon (O_3) hosil bo'ladi. Gaz holatidagi kislorodning zichligi $1,429 \text{ g/sm}^3$ (suyuq); $t_{\text{qayn}} = -182,9^\circ\text{C}$, $t_{\text{suyuq}} = -218,9^\circ\text{C}$; kritik harorati Cl_2 , CO_2 , SO_2 larning haroratidan past va $-118,84^\circ\text{C}$ ga teng. Kislorod kimyoviy jihatdan eng faol (ftordan keyin) metallmasdir.

Ko'pgina boshqa elementlar (vodorod, gologenlar, oltingugurt, metallar va boshqalar) bilan bevosita ta'sirlashadi va odatda issiqlik ajraladi. Harorat oshirilganda oksidlanish tezlashadi va yonish boshlanadi. Metallarning oksidlanishi - korroziya texnikaga katta zarar keltiradi.

Past haroratgacha sovutish usuli yordamida parchalash kislorod olishning asosiy usulidir. Materiallarni alanganish haroratigacha qizdirish yonuvchi gaz (atsetilin, propan, benzin) yordamida amalga oshiriladi. Dastak yoki mashinaga o'rnatiladigan keskichli kislorod bilan kesish past va o'rtacha uglerodli po'latlarni, kam legirlangan titan qotishmalarini kesishda ishlatiladi. Beton, temir-beton, o'rtacha chidamli materiallarni kesishda kislorodli naycha (kislorod o'tkaziladigan po'lat trubka) dan, xromli po'latlarni, cho'yan va mis qotishmalarini kesishda flyus qo'shilgan kislorod bilan kesishdan foydalaniladi; bu esa kesish paytida hosil bo'ladigan qiyin eriydigan shlamlarni chiqarib tashlashga imkon beradi. Kislorod bilan kesishdan randalash, yonish, tozalash va boshqalarda ham foydalaniladi.

Kislorod – konverter jarayoni – suyuq cho'yanga texnik jihatdan toza (95,5 % dan yuqori) kislorod purkashdan iborat konverter jarayoni. Odatda, sig'imi 300 t. gacha bo'lgan va asosi futerovkalangan tubiberk konverterlarda amalga oshiriladi. Kislorod yuqoridan furma orqali 0,8-1,2 MPa bosim ostida yuboriladi. Havo o'rniga kislorod qo'llanilishi tarkibida azot kam (0,002-0,006%) bo'lgan po'lat olishga imkon beradi.

Kislorod-konvertor jarayonida bir xil sifatli po'lat olish marten usulida olingan po'latga nisbatan ancha unumli.

Kislotabardosh materiallar – kislorodning yemiruvchi ta'siriga chidamli materiallar. Asosan, kimyo sanoatida turli sig'imdagi idishlar, ularni futerovkalash uchun, trubalar, shlanglar, asoslar yotqizishda,

minoralar qurishda, shuningdek, kislota ga chidamli germetiklar va zichlagichlar sifatida ishlatiladi.

Kislota bardosh materiallar metallar – yuqori darajada ligerlangan po‘latlar va cho‘yanlar, nikel, mis, Aluminiy, titan, sirkoniy, qalay, qo‘rg‘oshin, kumush, niobiy, tantal, oltin, platina va boshqa ba'zi metallar hamda qotishmalar; metallmas materiallar – tog‘ jinslari (andezit, beshtuanit, kvarsit, grenit, felzit), tosh quyma (diabaz, bazalt), polimerlar (polivinilxlorid, polietilen, ftoroplastlar va boshqa), keramika, betonlar, sintetik kauchuklarning ba'zi turlari asosida olinadigan rezina, shisha emallar, sementlar, mastikalar va boshqalar bo‘lishi mumkin.

Kislota bardoshlik – material (ko‘pincha minerallar) larning kislotalar ta'siriga qarshilik ko‘rsata olish xususiyati. Metall materiallarning kislorod xossasi sirt birligidan yemirilgan massa hajm bo‘yicha aniqlanadi. Nometall materiallarning, masalan, shishib chiqishi bo‘yicha yoki materialga kislota bilan ishlov berilgandan so‘ng massasining o‘zgarishi bo‘yicha (% da) aniqlanadi.

Kislorod bilan kesish – avtogen yoki gaz yordamida kesish – materiallarni kislorod oqimida kesish; bunda oqim mahsulotlarni chiqarib yuborish uchun ham xizmat qiladi va kislorod turli gazlarning yonishiga yordam berib, o‘ta yuqori nazoratni ta'minlaydi

Minerallari. Tabiatda kislorod minerallar tarkibida ko‘p uchraydi.

Masalan, villemit - Zn_2SiO_4 ;

klinojdrit - $Zn_2Ca_2Si_2O_7[OH]_3 \cdot H_2O$;

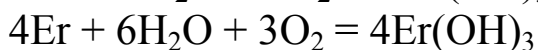
tarbutt - $Zn_2[PO_4][OH]$ va boshqalar.

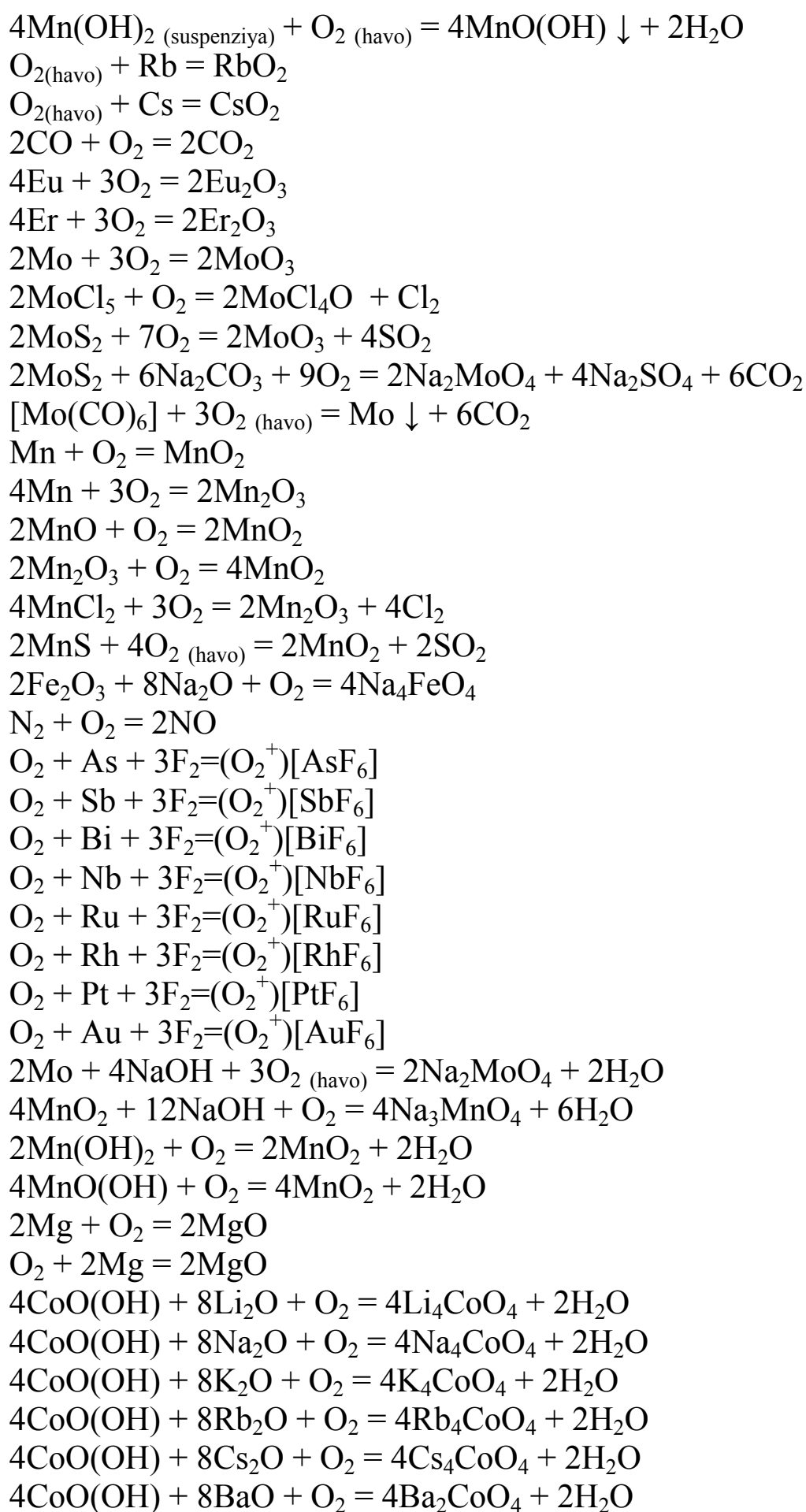
Ishlatilishi. Kislorod metallarga gaz alangasida ishlov berish, payvandlash, gaz yordamida kesish jarayonlarida foydalaniladi. Kislorod kimyo sanoatida sun'iy suyuq yoqilg‘i, azot va sulfat kislotalari, metalloksidlari va peroksidlarini olishda, suyuq kislorod - portlatishda, reaktiv dvigatellarda hamda sovuq agent sifatida foydalaniladi. Ballonga to‘ldirilgan toza kisloroddan kosmik parvozlarda, suv ostida suzishda, tibbiyotda foydalaniladi.

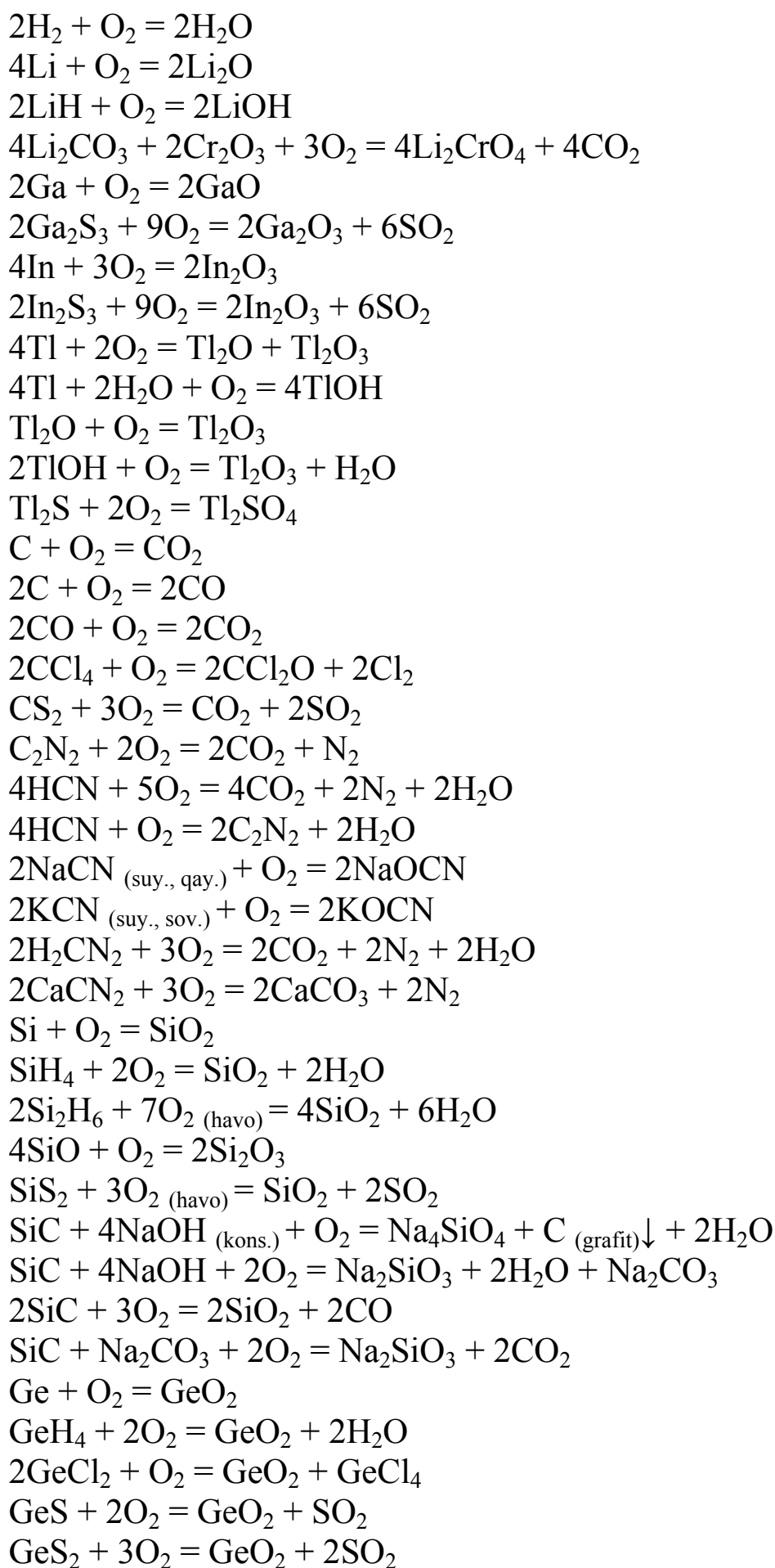
Qotishmalari. Po‘lat va cho‘yan sanoatida kislorod oksidlash maqsadida ishlatiladi.

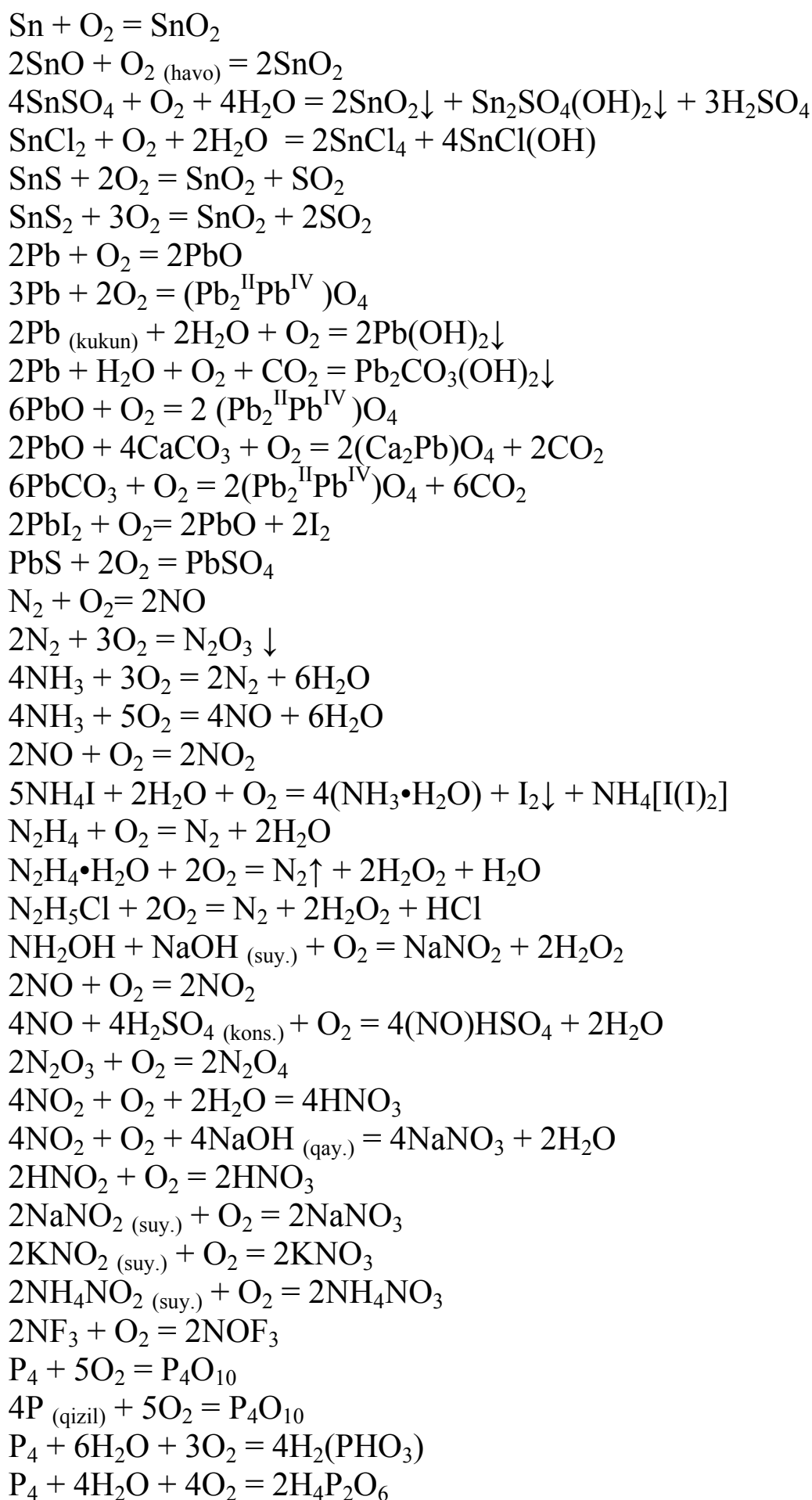
Olinishi. Kislorod sanoatda suyuq havoni yoki qisman suvni elektroliz qilish usuli bilan olinadi.

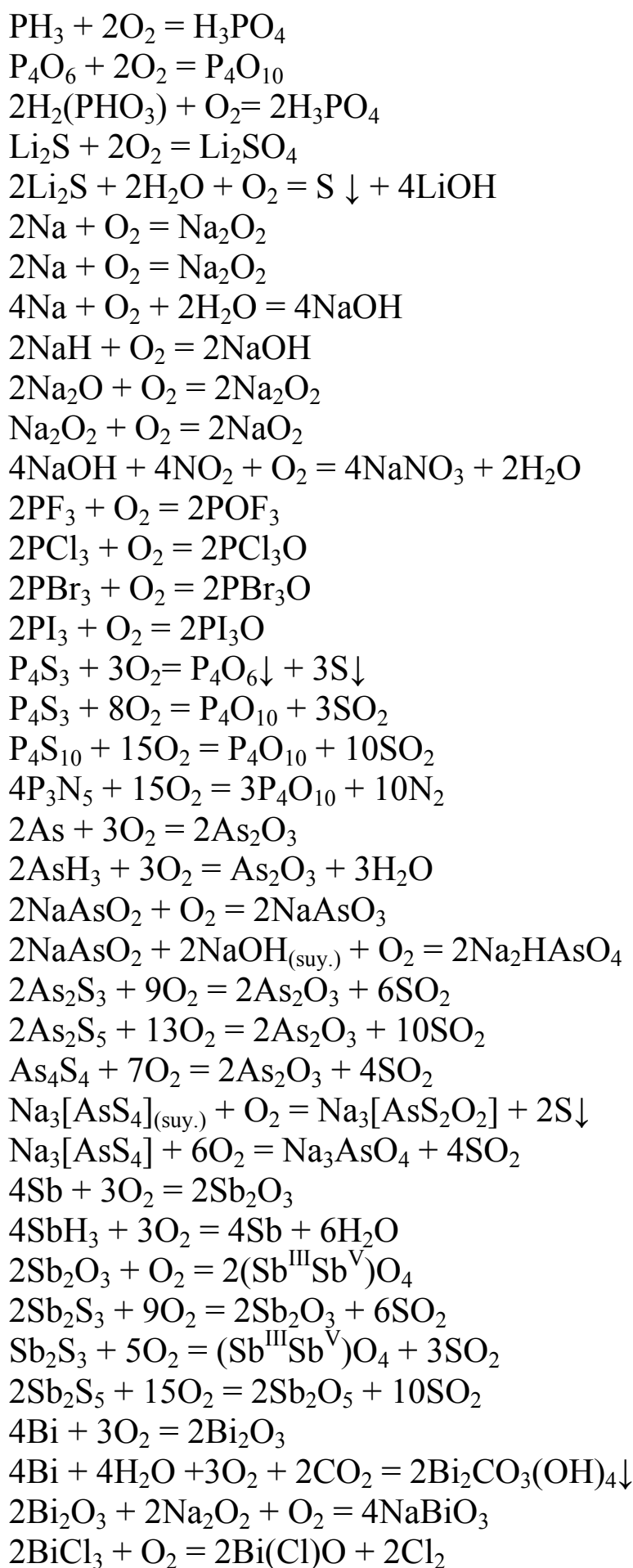
Kimyoviy xossalari:

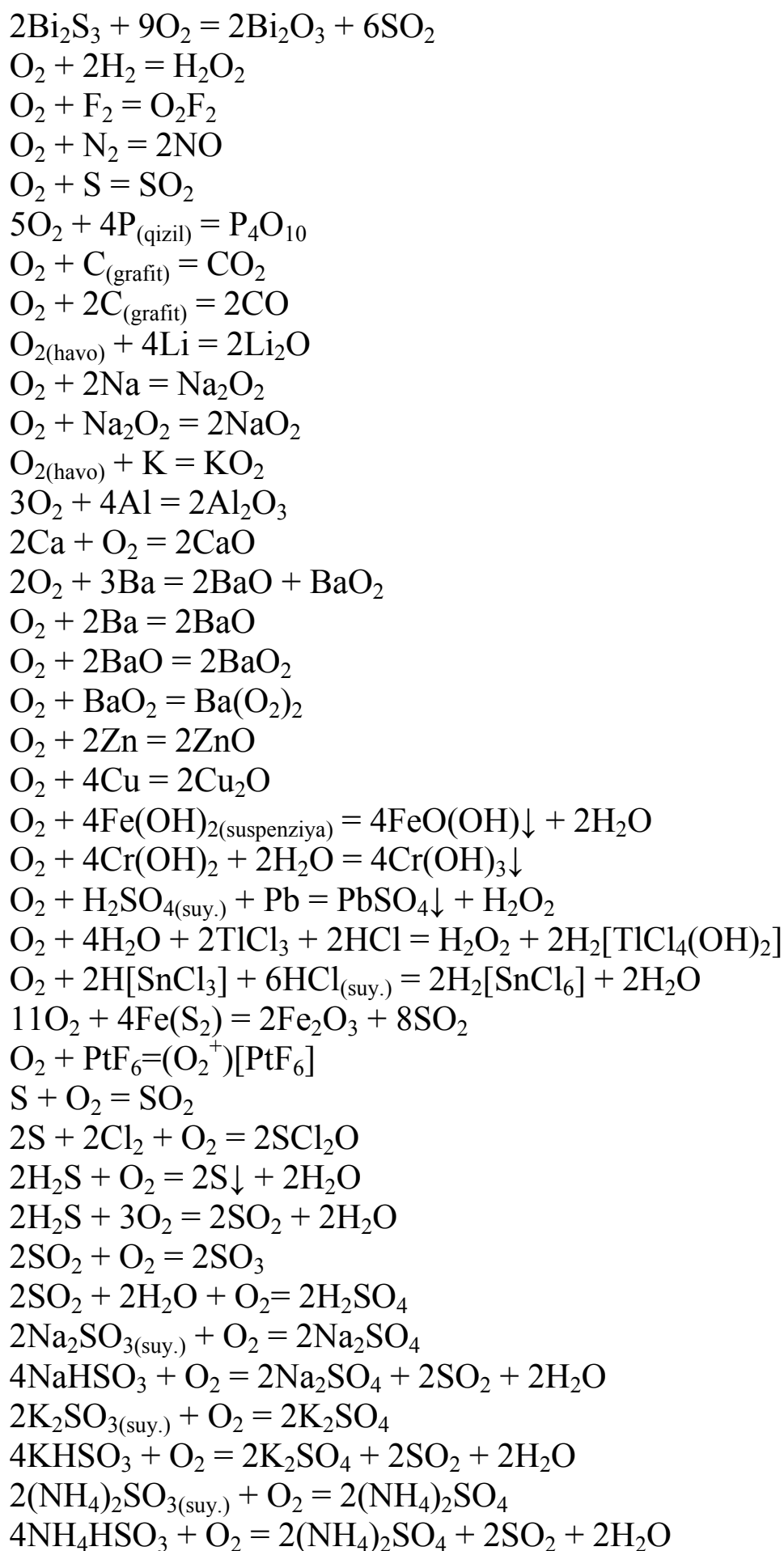


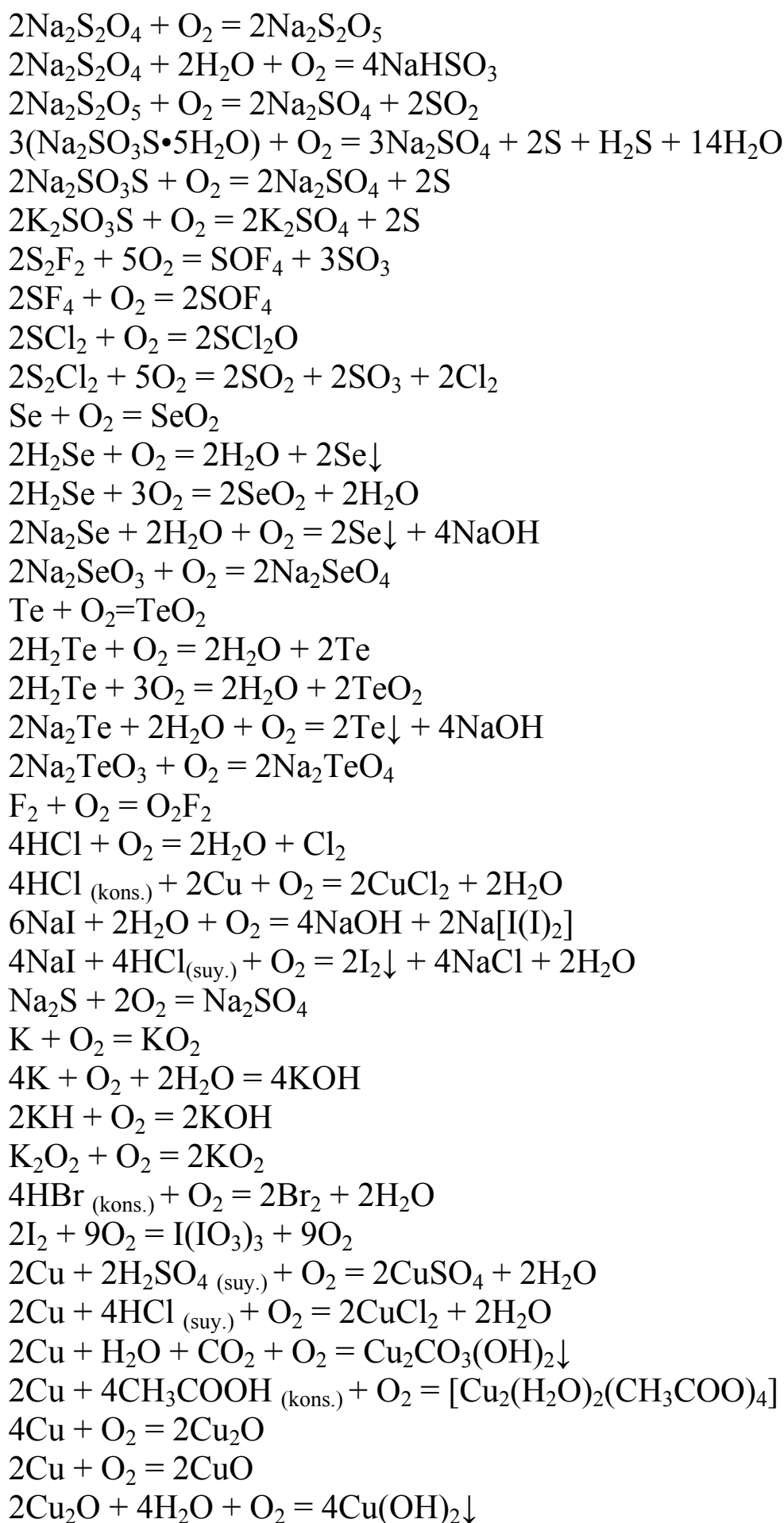


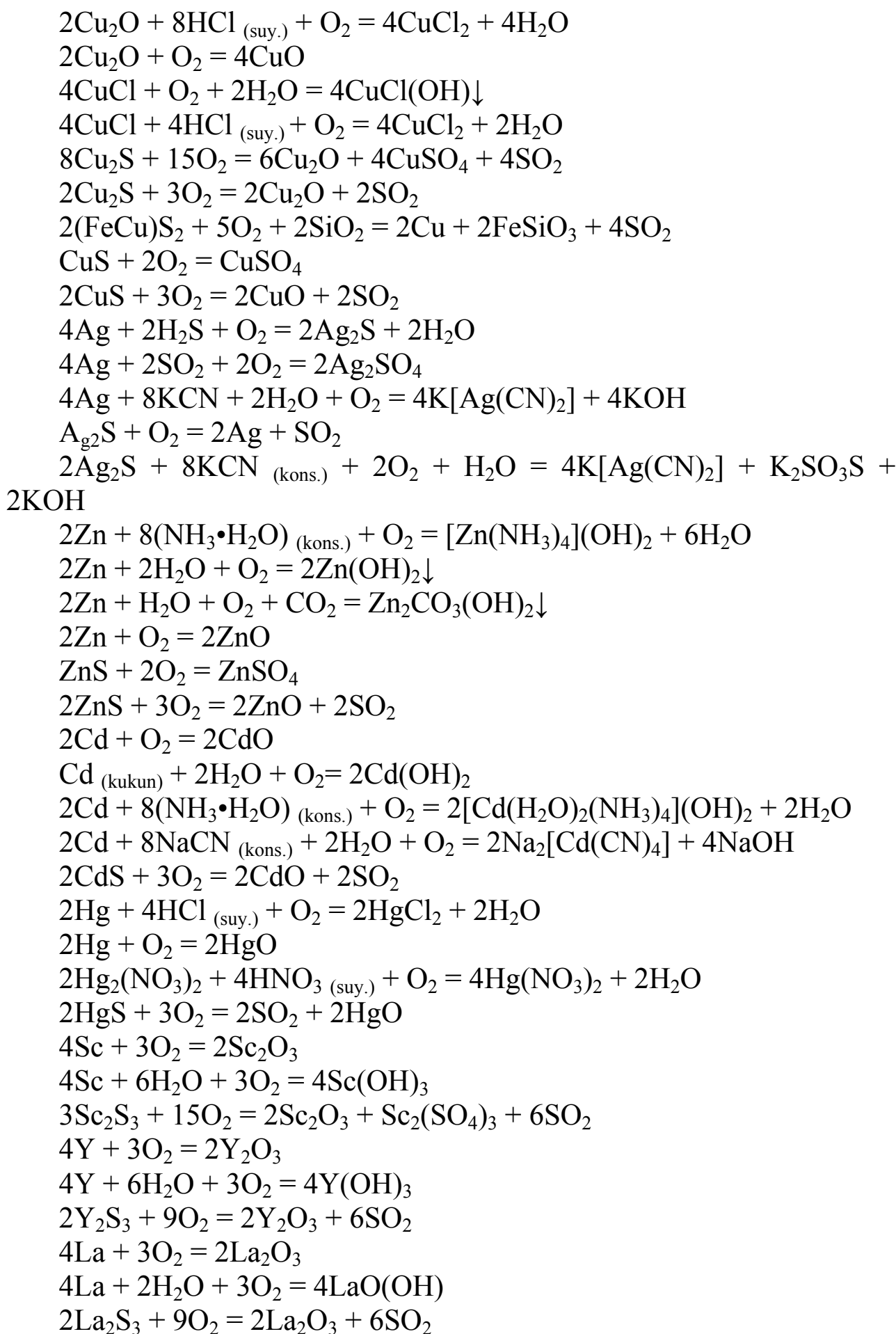


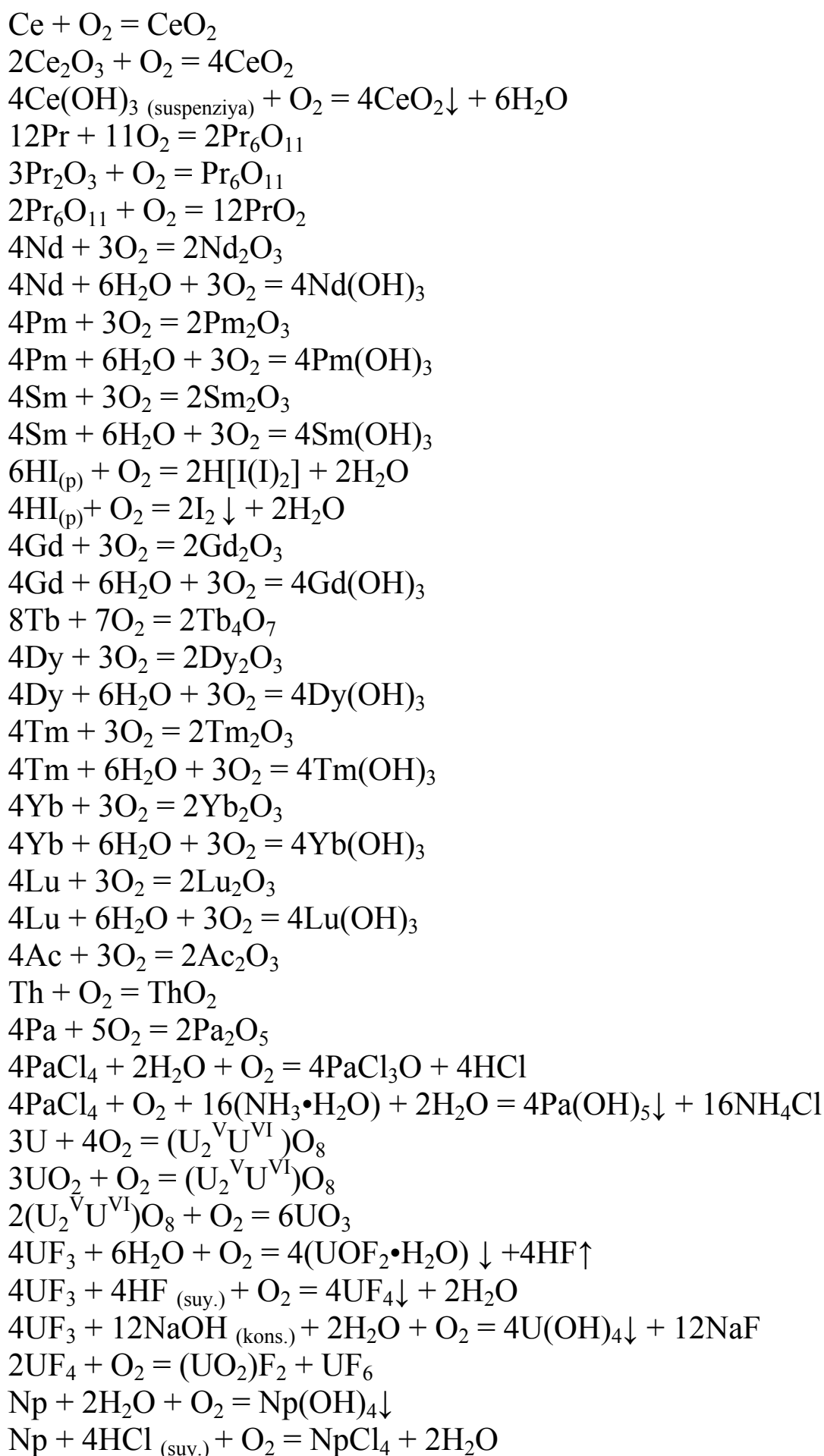


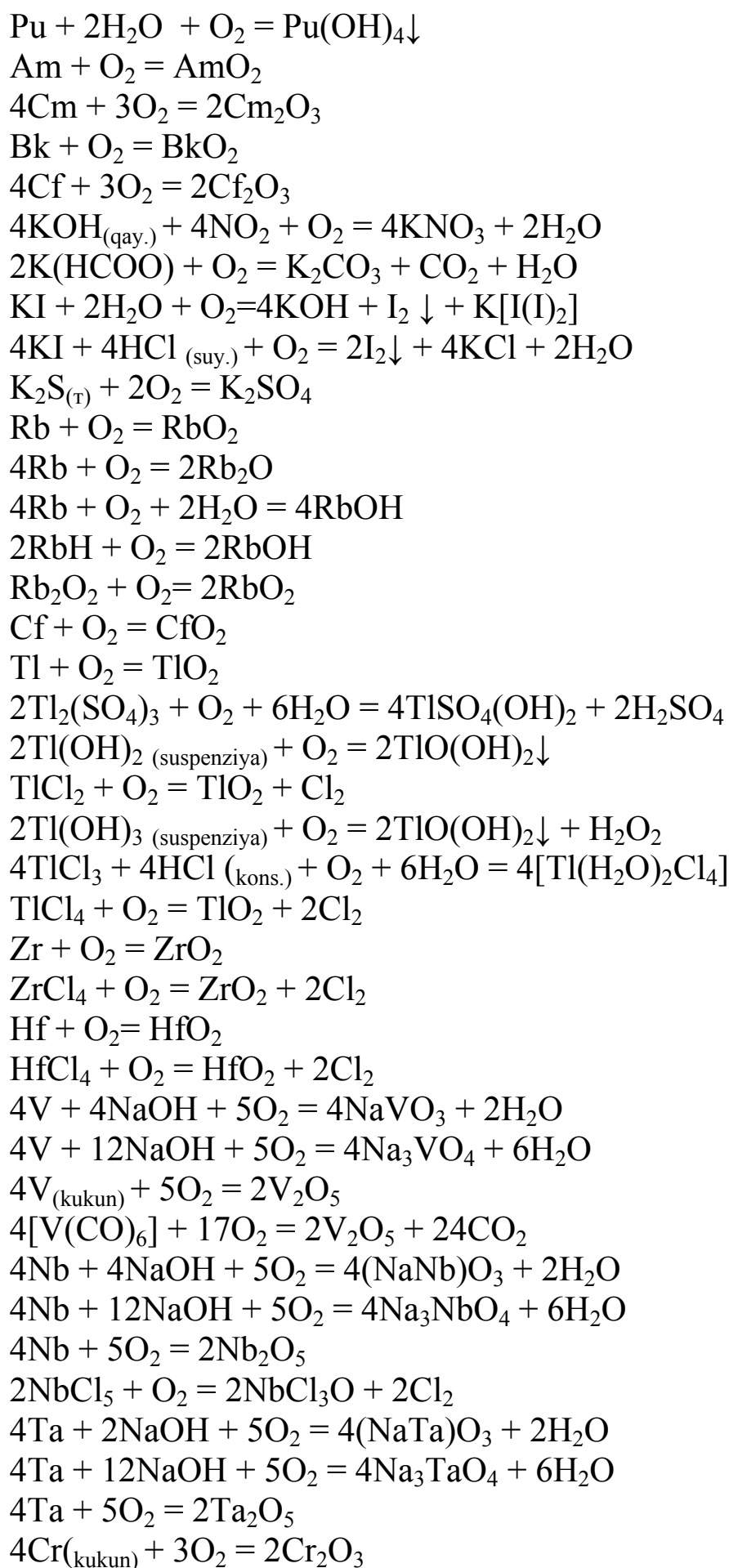


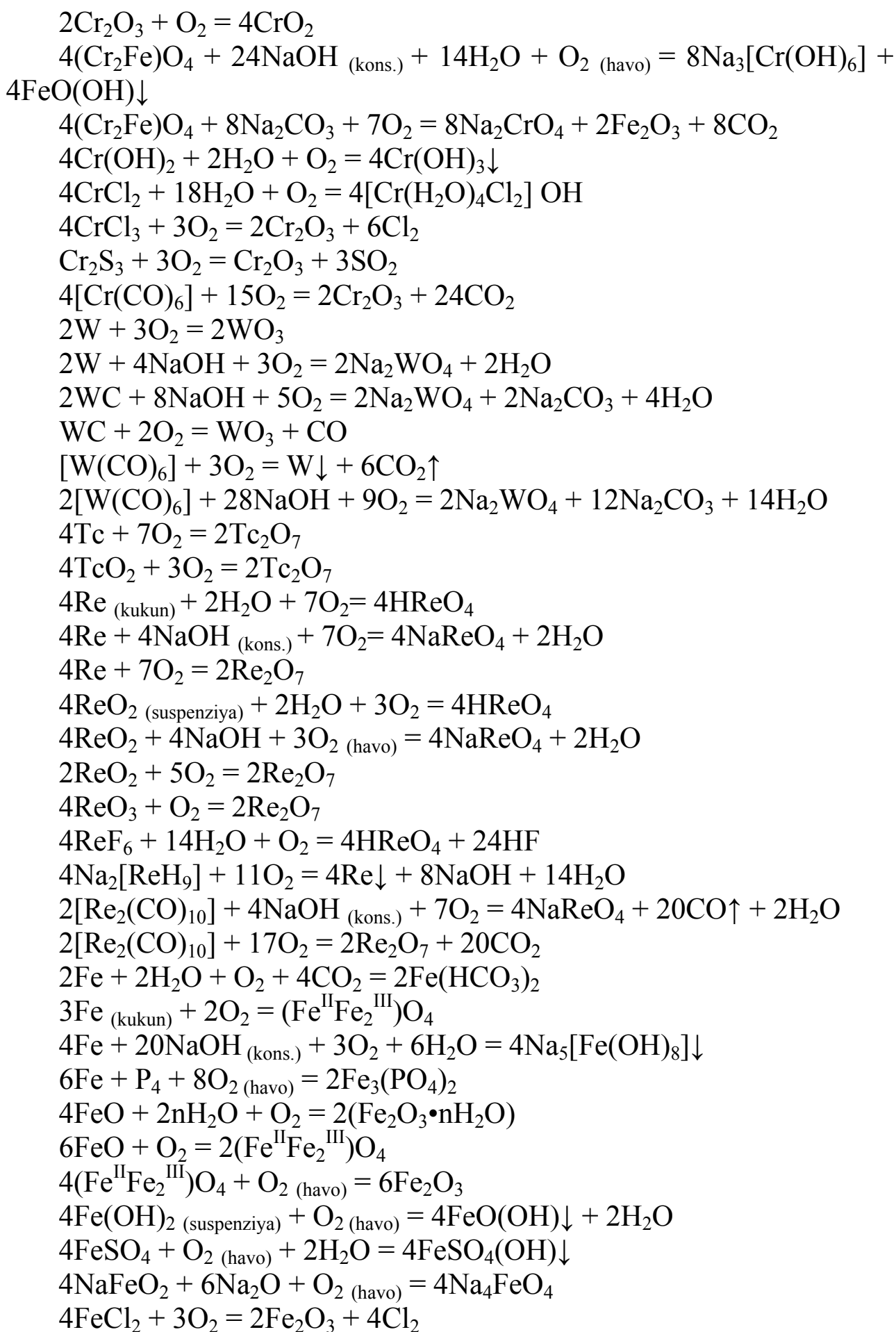


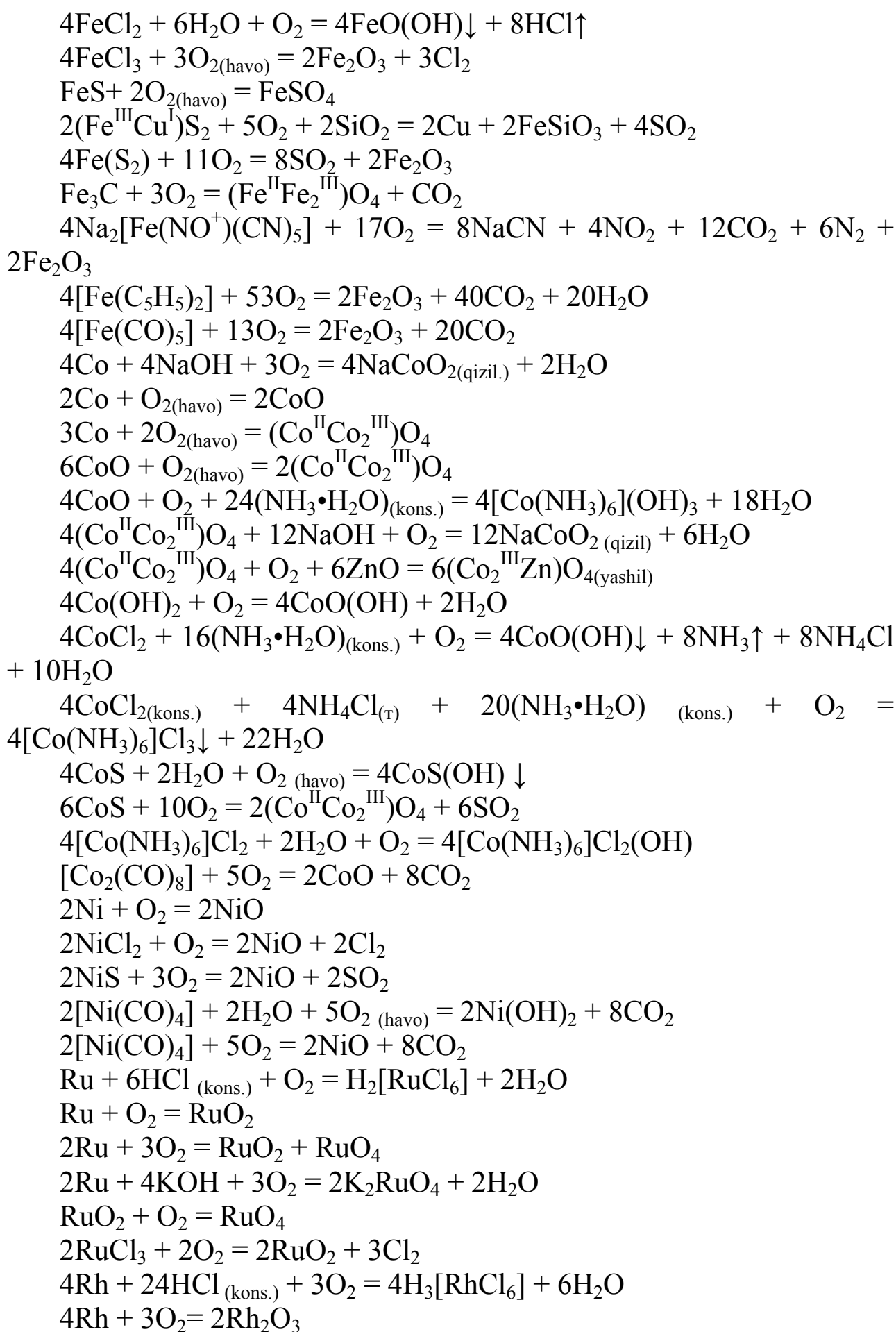


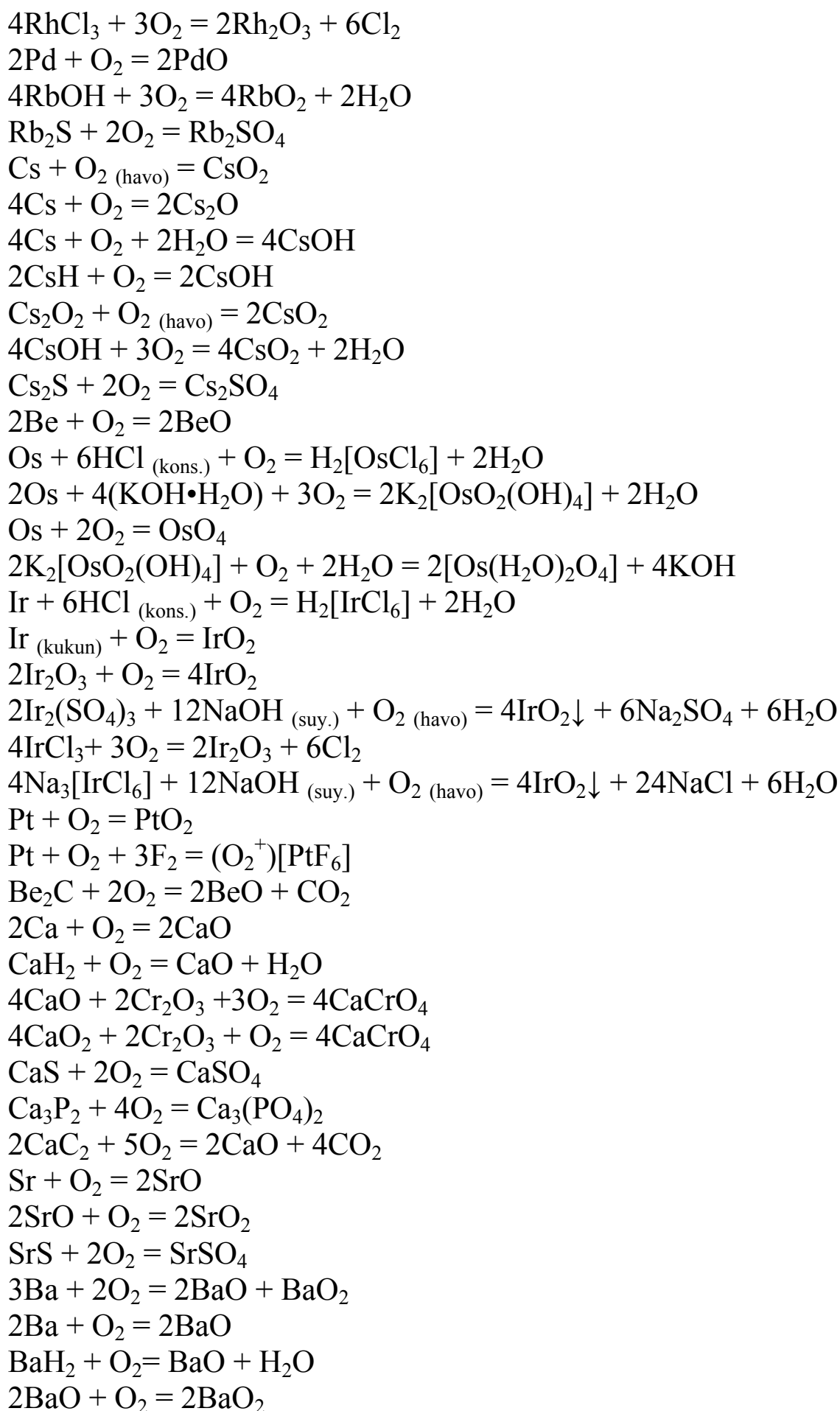


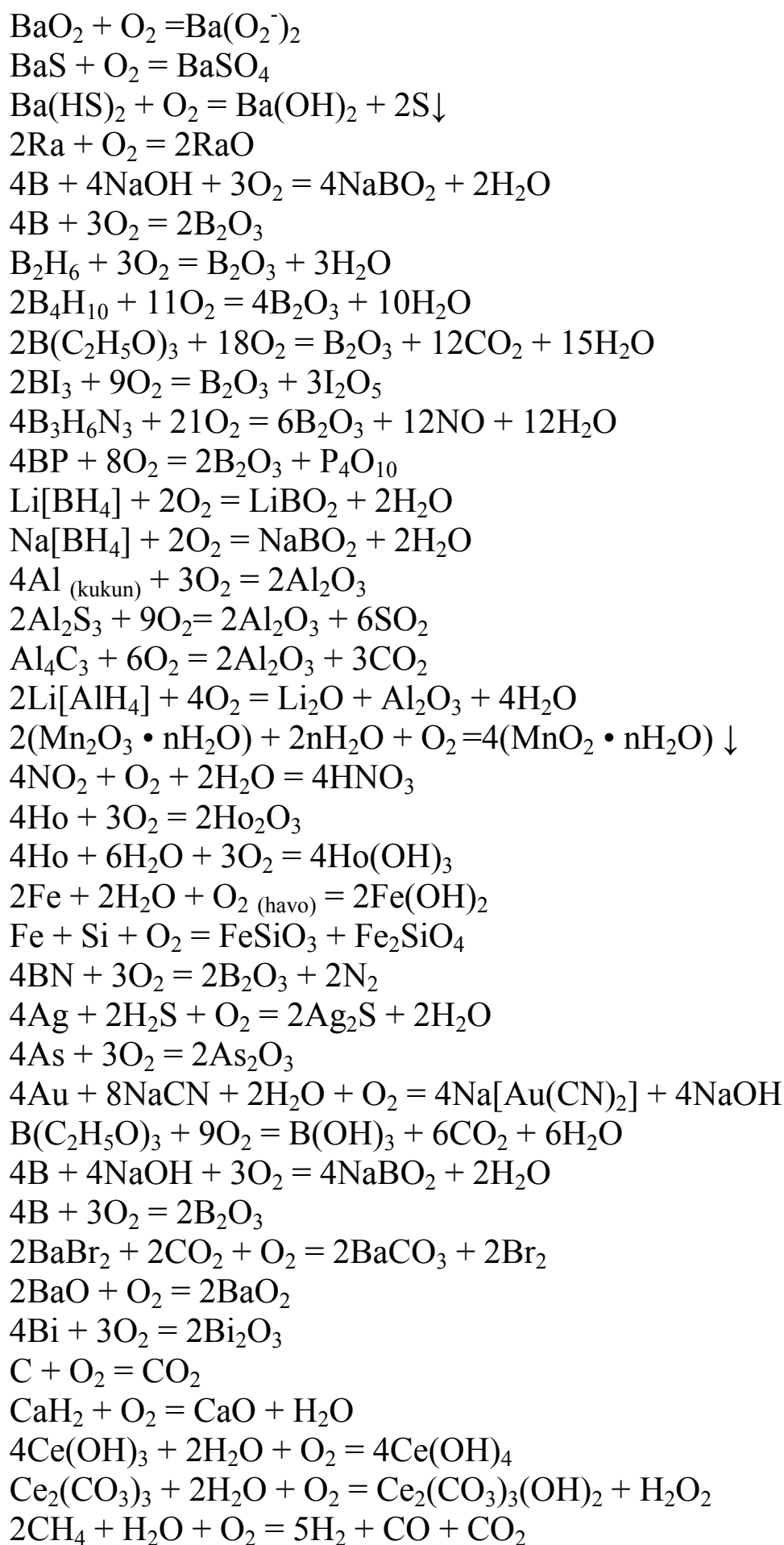


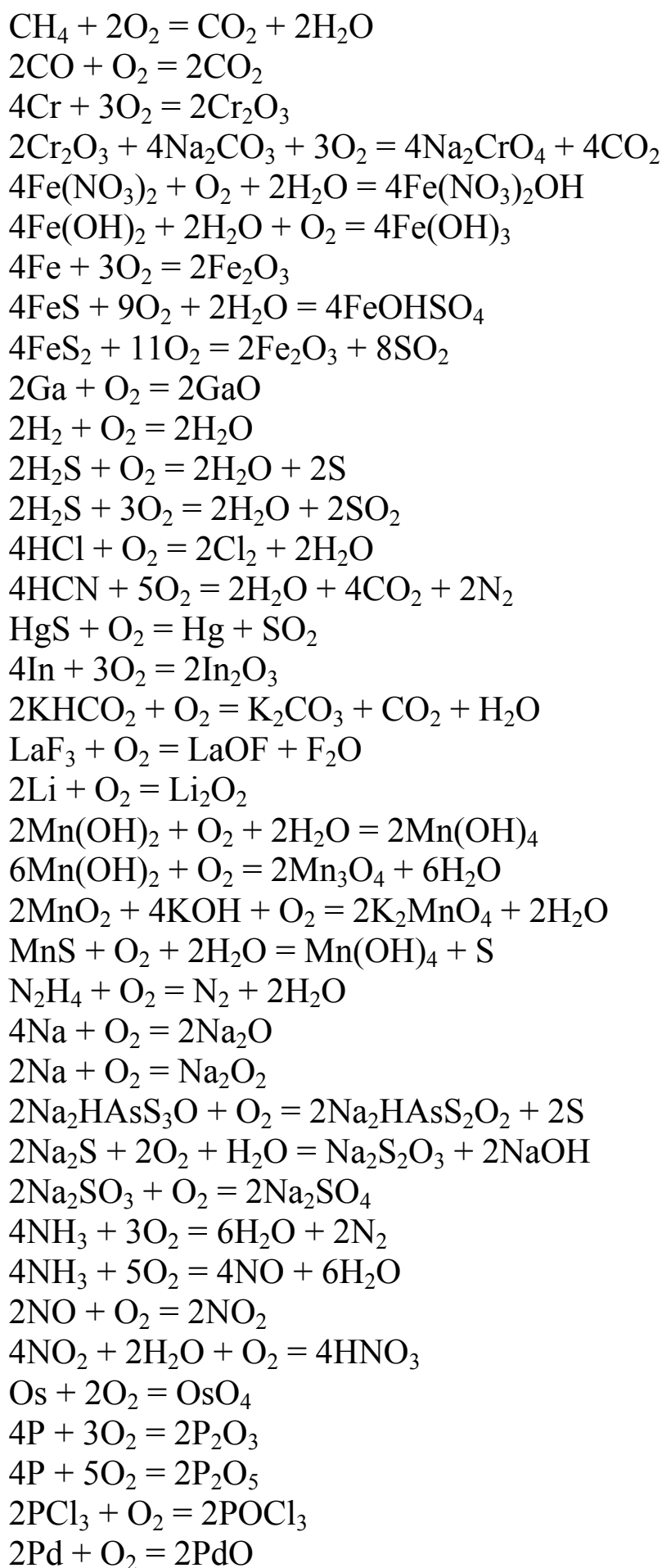


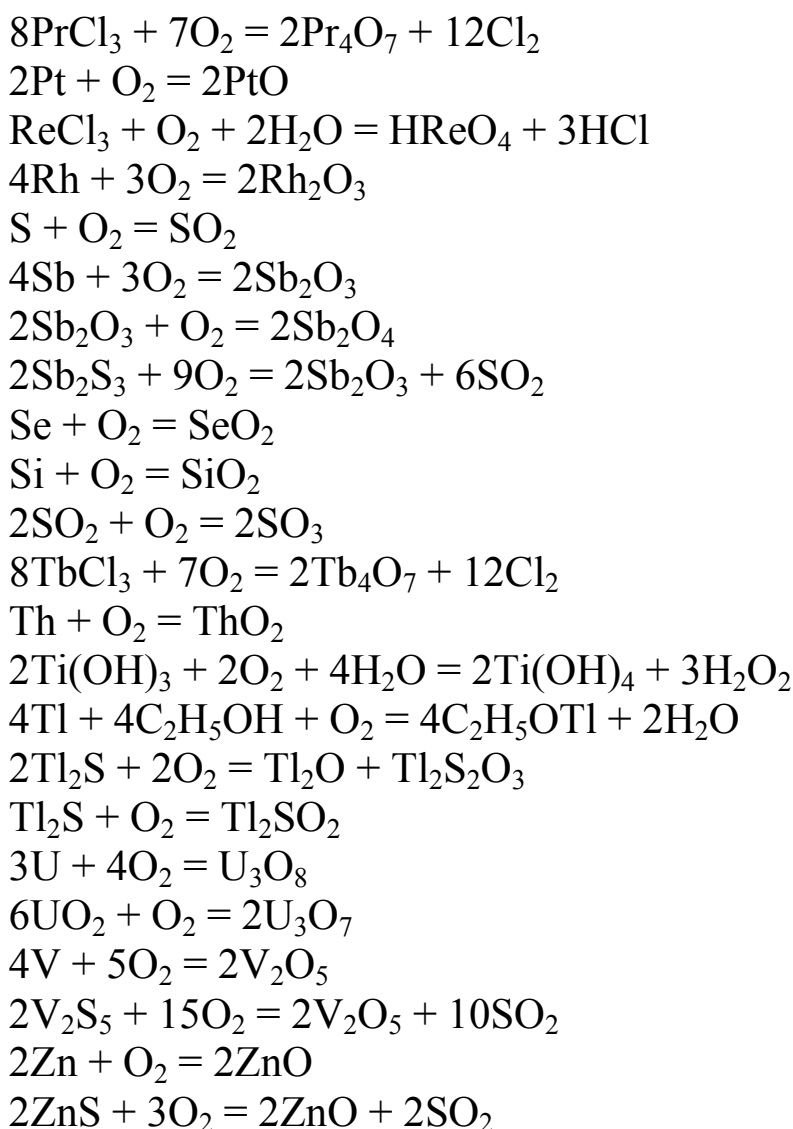












Ftor – F

FTOR: belgisi - F. 1810-yilda kashf etilgan bo'lib, faqat 1886-yildagina erkin holda olingan. Davriy sistemaning VII guruh kimyoviy elementi, (Fluorum, lotincha “fliuor” kuydiradigan degan soʻz bilan atalgan), metallmas kimyoviy elementlar ichida eng faoli ftordir, shuning uchun ham u tabiatda umuman erkin holda uchramaydi, tartib raqami 9, atom massasi 18,9984, zichligi 1,14 g/sm³ (havoga nisbatan),

$$t_{\text{qayn}} = -188,13^{\circ}\text{C}, t_{\text{suyuq}} = -219,6^{\circ}\text{C}.$$

Ftor oksidlari - F₂O₂ jigarrang gaz, -163⁰C dan past haroratda qizil kristallik modda; $t_{\text{suyuq}} = 1630^{\circ}\text{C}$; suyuqlanganda qip-qizil suyuqlikka aylanadi; $t_{\text{qayn}} = -57^{\circ}\text{C}$, -50⁰C da atomlarga ajralib ketadi;

F₂O - rangsiz gaz, kuchli oksidlovchi; hidi ozon hidiga oʻxshaydi; $t_{\text{suyuq}} = 223^{\circ}\text{C}$, $t_{\text{qayn}} = 144,8^{\circ}\text{C}$, **F₂O₃** - sariq suyuqlik, suvda oz eriydi.

F_2O_3 - juda past haroratlarda mavjud bo'la oladi; suyakda, tishda bo'ladi, piyoz va yasmiqda ham bor, sarg'ish-yashil gaz; o'zi ham, birikmalari ham zaharli, suvda erimaydi.

Ftorid kislota - HF, vodorod ftoridning suvdagi eritmasi; kuchli kislotalarga nisbatan hiyla kuchsiz kislota; sotuladigan eritmasi 35,35 % li bo'ladi; zichligi $1,15 \text{ g/cm}^3$, $t_{\text{suyuq}}=35^{\circ}\text{C}$, $t_{\text{qayn}}=120^{\circ}\text{C}$; ftorid kislota ning konsentrlangan eritmalarida ftor ionlari bilan HF_2 tarkibli murakkab ionlar ko'proq bo'ladi, shuning uchun ftorid kislota ning $KF \cdot HF$, $KF \cdot 2HF$, $KF \cdot 3HF$, $KF \cdot 4HF$ tarkibli tuzlari bor; terini kuydiradi, tirnoq ostlarini yara qiladi; zahari shishani o'yadi.

Minerallari. Ftor metallmaslarning eng faoli, shuning uchun erkin holda uchramaydi, asosan, tabiatda oksid holda, kislorod birikmalari bilan gazsimon holatda keng tarqalgan bo'ladi; eng muhim minerali flyuorit CaF_2 dir.

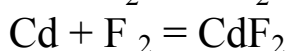
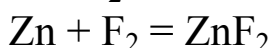
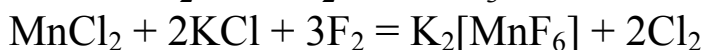
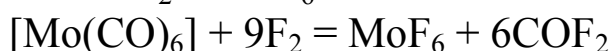
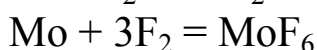
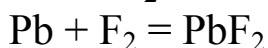
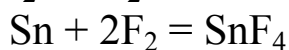
Ishlatilishi. Anorganik kimyoda ftor quyidagi moddalar bilan reagent sifatida qatnashib, birikmalar hosil qiladi: UF_6 ; UF_4 ;

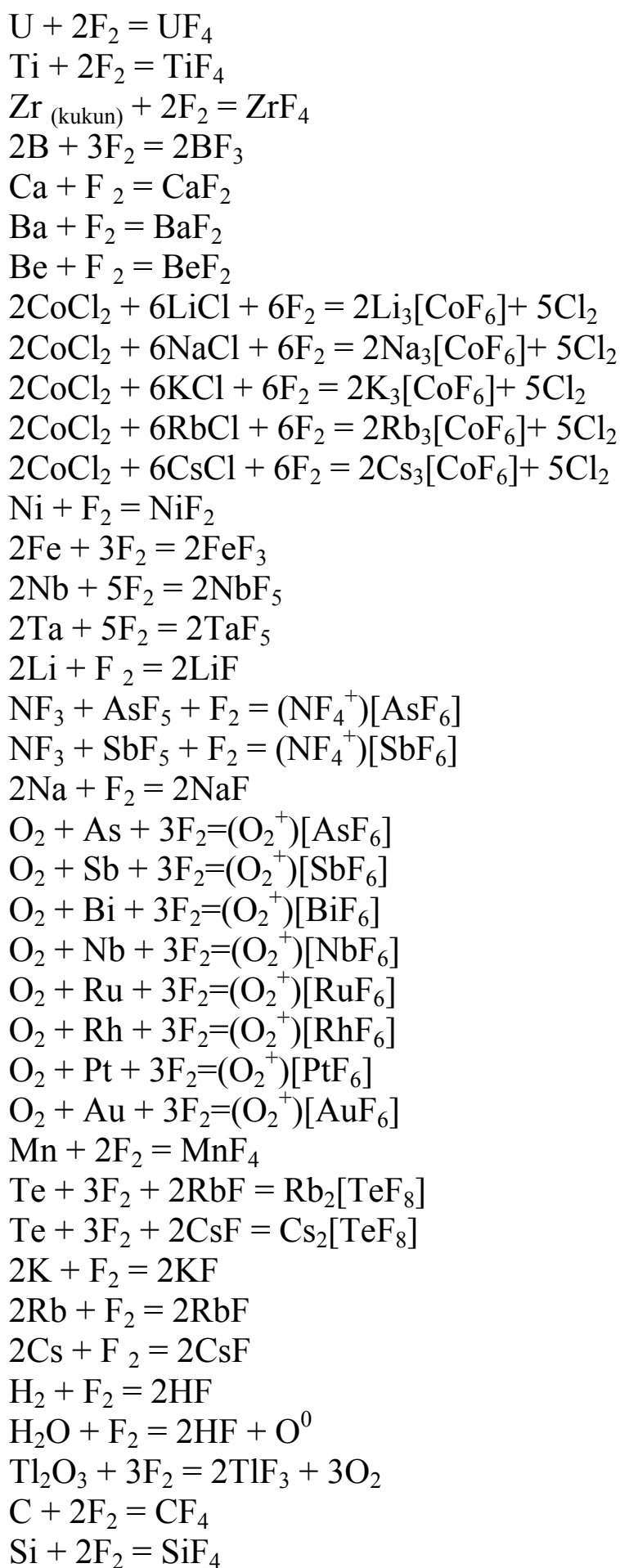
Qotishmalari. Ayrim rangli metallar bilan ftor qotishmalar hosil qiladi, WF_6 , TiF_4 .

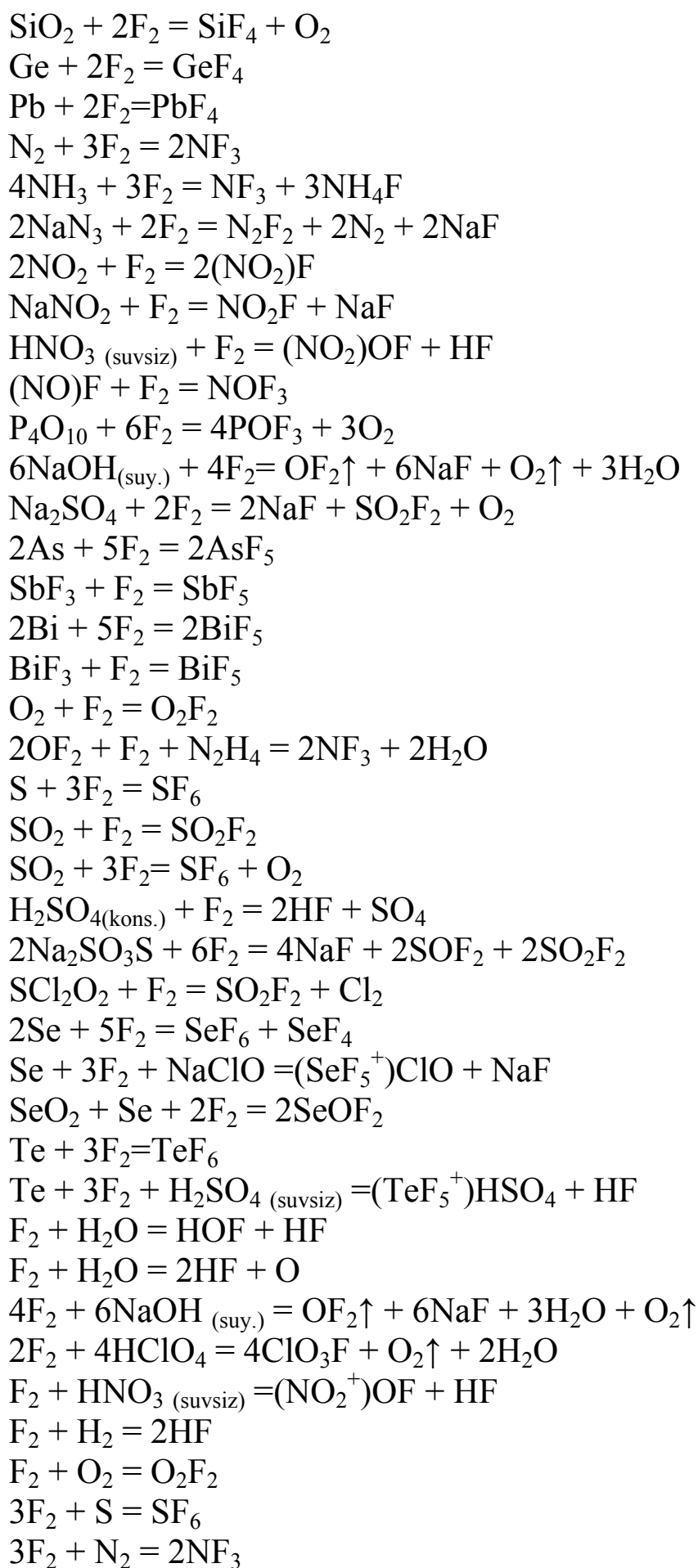
Olinishi. Ftor olish texnologiyasida elektroliz usulida gidroftorid kaliyning dissotsiyalanishidan anodga erkin ftor $2F \rightarrow F_2 + 2e$, katodga esa $2H^{++} + 2e \rightarrow H_2$ ajratib olinadi.

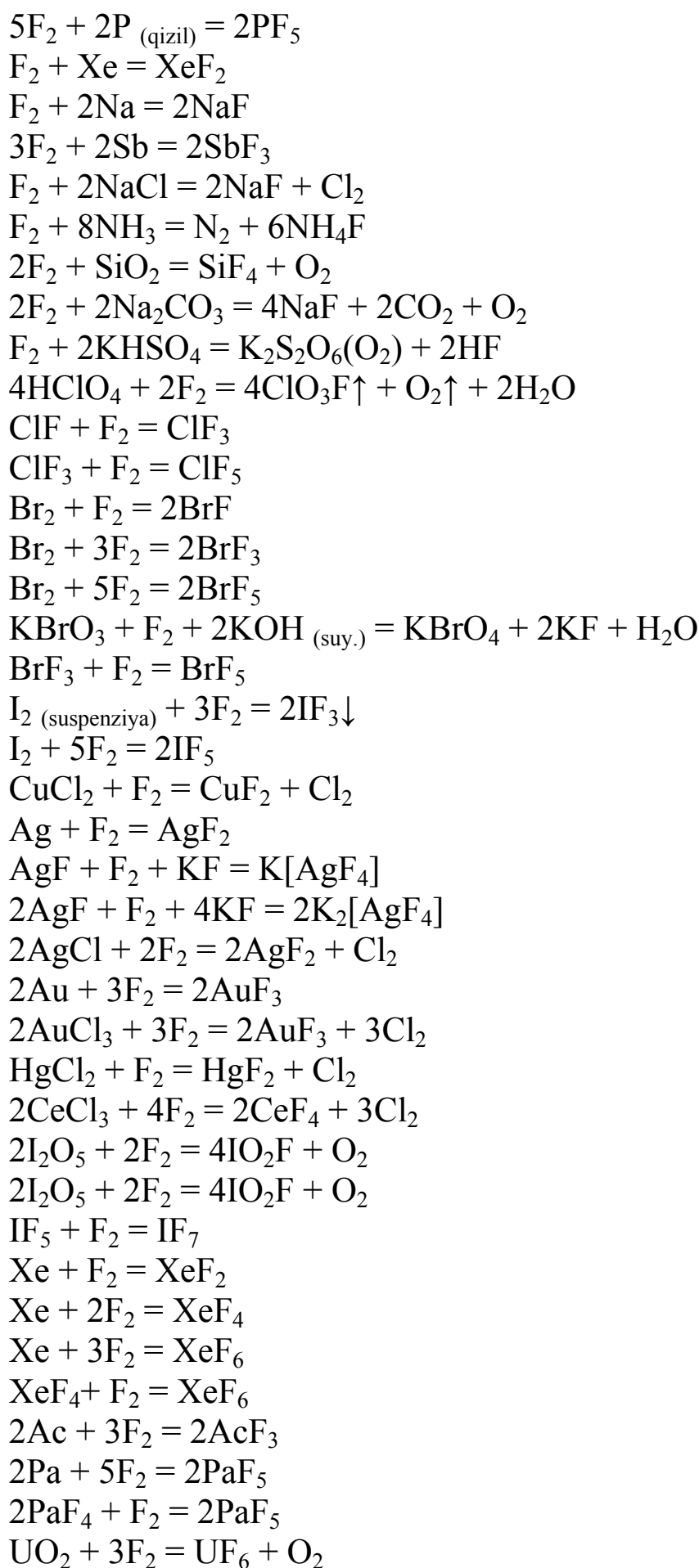
Ftor birikmalarini qayta ishlash texnologiyasida ftor ajratib olinadi. Shuningdek, ftor va uning aralashmasi ($HF-KF$) 250°C da elektroliz usulida olinadi. Jarayon mis va nikeldan yasalgan idishlarda olib boriladi. Elektrolarning bunday metallari ftor bilan ajratib olinadi. Tabiatda ftorning faqat bitta izotopi ^{19}F uchraydi.

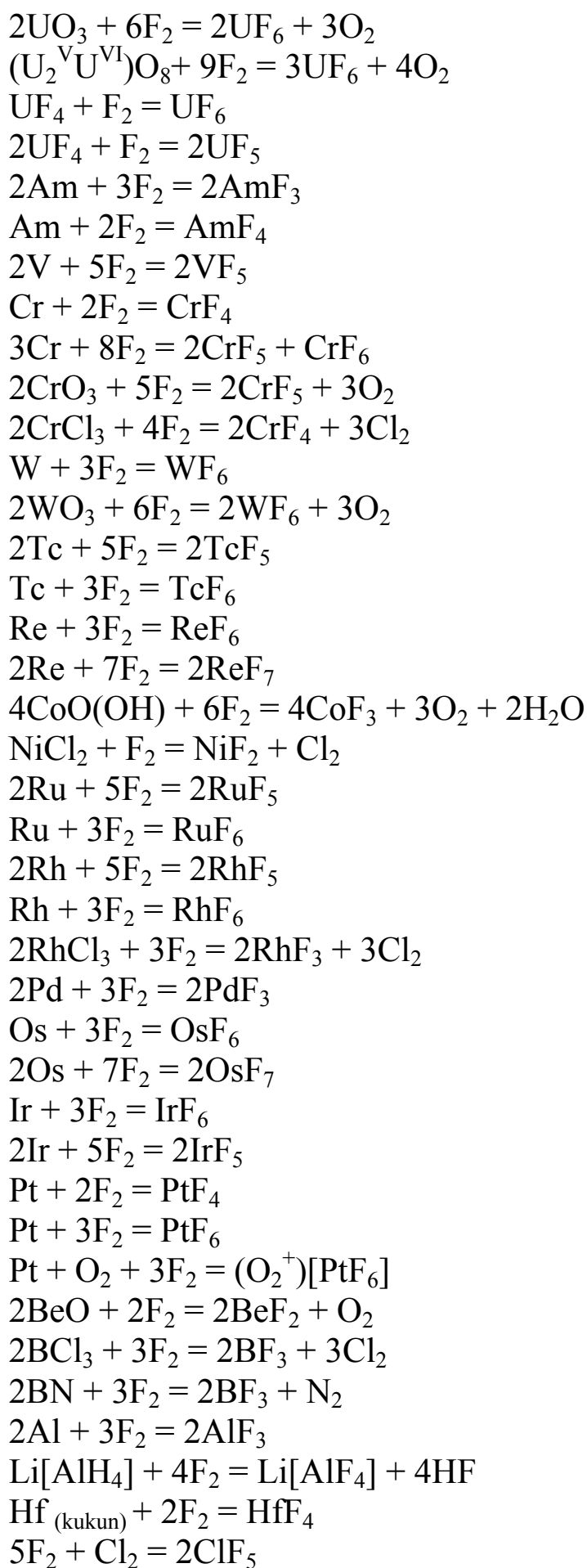
Kimyoviy xossalari:

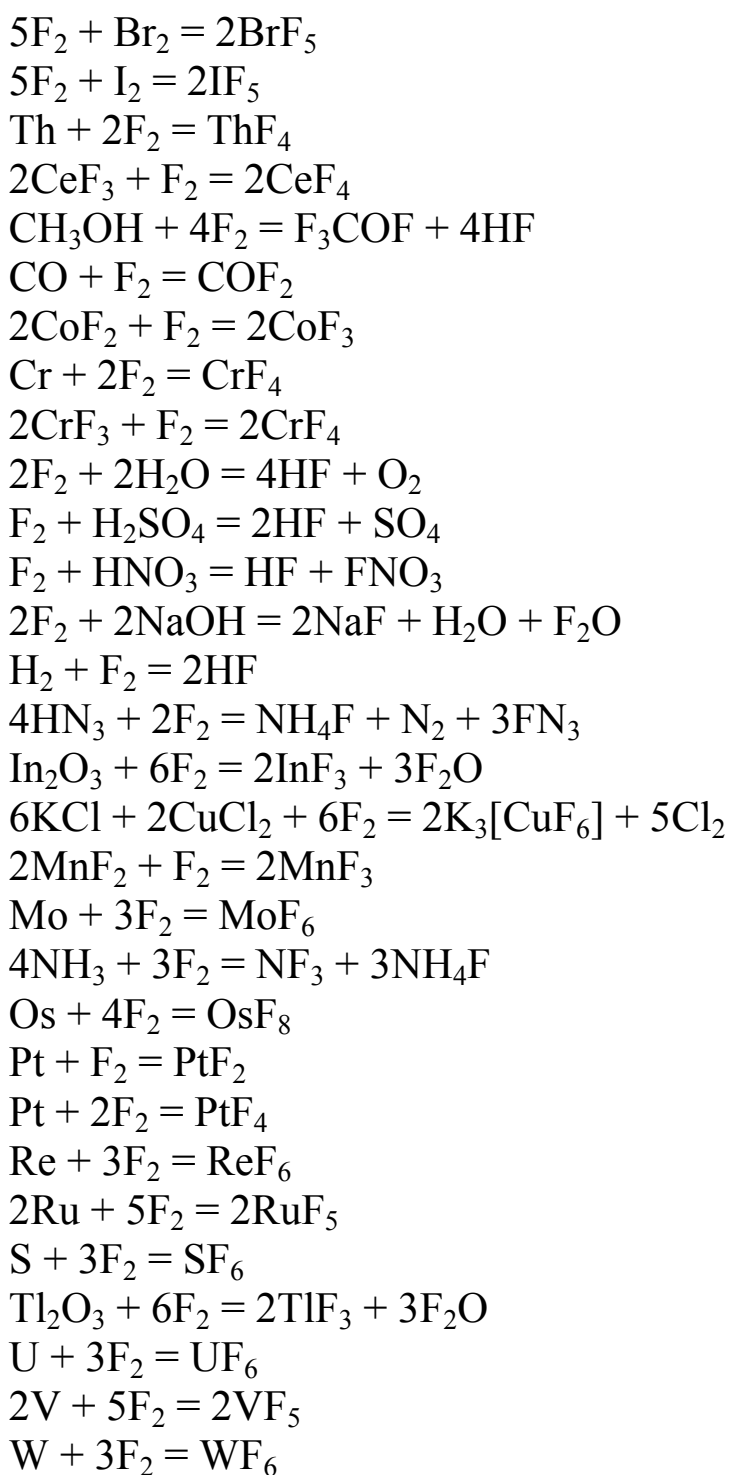












Natriy -Na

NATRIY: belgisi - **Na**. 1807-yili ingliz kimyogari va fizigi G. Devi natriyni NaON dan elektroliz yo‘li bilan birinchi bo‘lib ajratib oldi. Natriy yunoncha “nitron” - tabiiy soda; qadimiy yahudiycha “neter” ko‘piruvchi degan so‘zdan olingan. (lot. Natrium), tartib raqami 11, atom massasi 22,99877, zichligi 0,968 g/sm³, t_{suyuq}=98⁰C, t_{qayn}=882,9⁰C. Natriy ishqoriy

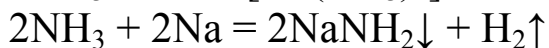
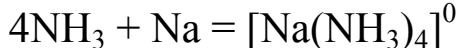
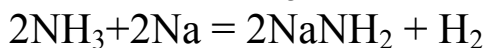
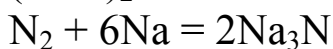
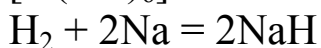
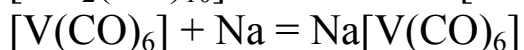
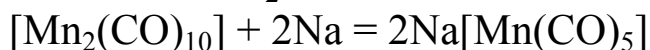
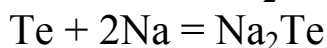
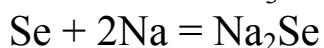
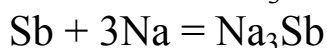
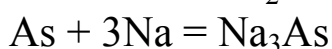
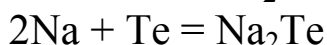
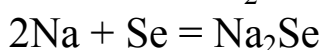
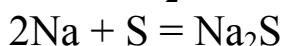
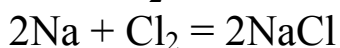
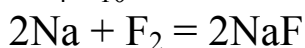
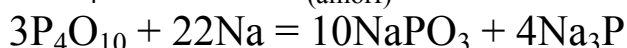
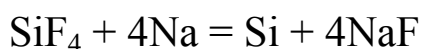
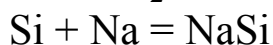
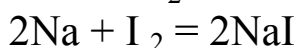
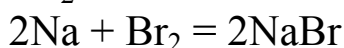
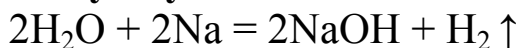
metallar guruhiga kiruvchi yengil yumshoq metall, kumushsimon - oq rangli, havoda tez oksidlanadi.

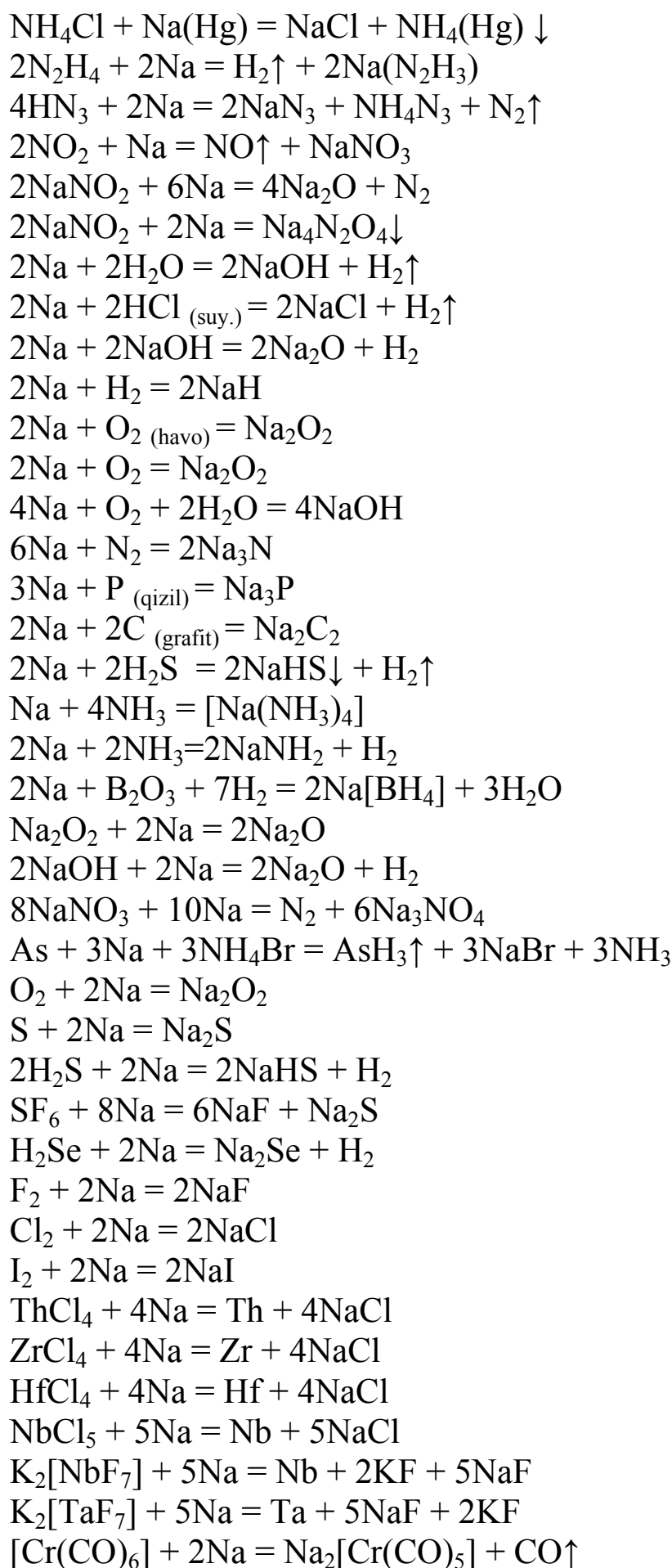
Qotishmalari. Natriy metalli mis, kadmiy, stronsiy birikmalarini hosil qiladi.

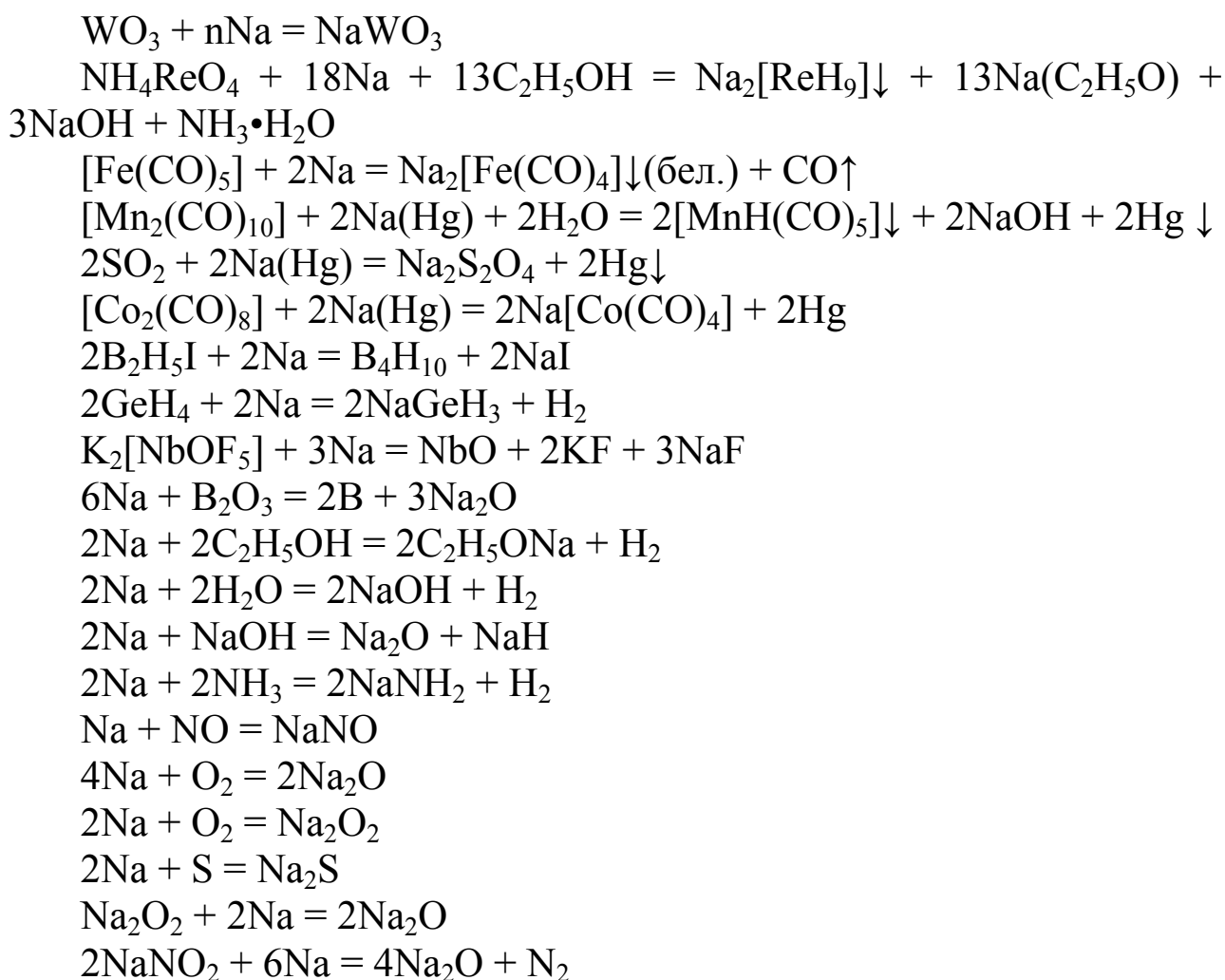
Olinishi. Natriy metalli asosan ikki usulda olinadi. Birinchisi, natriy gidroksidini suyuqlantirib, elektroliz qilinadi. Bunda anod nikeldan, katod temirdan yasaladi. Katodda natriy metalli qaytariladi. Natriy xlor tuzini suyuqlantirib, elektroliz qilish yo‘li bilan olinadi. Shuningdek, natriy suyultirilgan natriy xlorid yoki natriy gidroksidni elektroliz qilish yo‘li bilan olinadi. Katodda natriy ajralib chiqadi: K - (katod) Na, A - (anod) Cl.

Natriy xloridning suyuqlanish haroratini 800⁰C dan pasaytirish uchun (575-585⁰C) unga KCl, CaCl₂, NaF yoki boshqa tuzlar qo‘shiladi.

Kimyoviy xossalari:







Magniy - Mg

MAGNIY: belgisi - **Mg**. Magniy 1808-yilda birinchi marotaba olingan. 1830-yilda Faradey elektroliz yo‘li bilan bir necha gramm ajratib oldi. 1860-yillarga kelib magniy Angliya va AQSHda olina boshlandi.

Davriy sistemaning II guruh kimyoviy elementi, Mg(lot.Magnesium), tartib raqami 12, atom massasi 24,305. Yaltiroq kumushsimon - oq, juda yengil metall, havoda sekin oksidlanib, oksid pardasi bilan qoplanadi; zichligi 1,74 g/cm³, t_{suyuq}=651⁰C, t_{qayn}=1110⁰C, magniy ko‘p yorug‘lik taratib, ravshan yonadi, alangasida ultrabinafsha nurlari ko‘p, sovuq suvda erimaydi, kislotalar va ammoniy tuzlarida eriydi.

Minerallari. Tabiatda silikatlar tarzida keng tarqalgan metallardan biri. Yer kurrasida og‘irligi bo‘yicha 2,35%. Magniy karbonatlari magnezitva dolomitning nihoyatda katta to‘plamlari mavjud, shuningdek, karnallit ham muhim sanoat xomashyosi hisoblanadi.

Olivin - MgSiO₄;

talk - $Mg_3H_2(SiO_3)_4$;

asbest - $Mg_3H_4Si_2O_4$;

dolomit - $MgCO_3 \cdot CaCO_3$;

magnezit- $MgCO_3$;

Xloridlar – bishofit - $MgCl_2 \cdot 6H_2O$;

karnallit - $KCl \cdot MgCl_2 \cdot 6H_2O$;

Quyidagi 4 ta mineral sanoatda magniy olishda keng qoʻllaniladi:

Magniy-magnezit - $MgCO_3$;

dolomit - $MgCO_3 \cdot CaCO_3$;

karnalmet - $KCl \cdot MgCl_2 \cdot 6H_2O$;

bishofit - $MgCl_2 \cdot 6H_2O$;

Ishlatilishi. Magniy, asosan, yengil qotishmalar ishlab chiqarishda; metallurgiyada ba'zi metall va qotishmalarni oksidlantirish va oltingugurtdan tozalashda, qiyin tiklanuvchi metallar (masalan, titan) hosil qilishda; magniy kukunining oksidlagichlar bilan aralashmalari yorituvchi va yondiruvchi reaktorlar, snaryadlar tayyorlashda, kino va fototexnikada; magniy birikmalari qurilish materiallari (sement, ksilolit, fibrolit vaboshqa) ishlab chiqarishda ishlatiladi. Mexanik xossalari yuqori, raketazotlik, kosmik texnika jihozlar tayyorlashda va boshqalarda ishlatiladi. Magniyning koʻpgina qotishmalari texnikada ishlatiladi, oʻzi kimyo laboratoriyalarida, fotografiyada ishlatiladi.

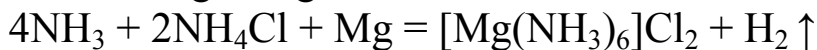
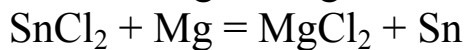
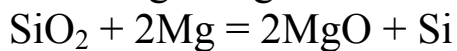
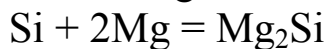
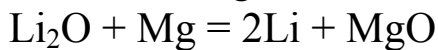
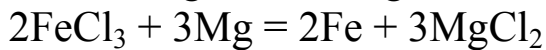
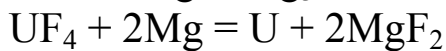
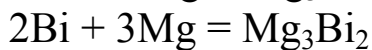
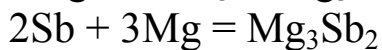
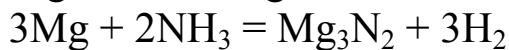
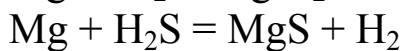
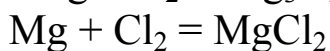
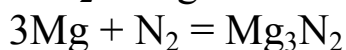
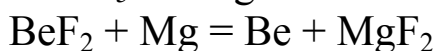
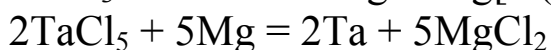
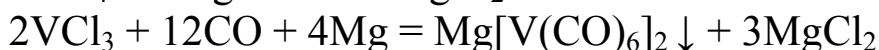
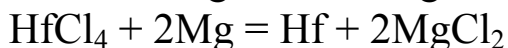
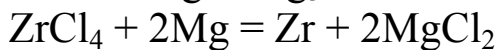
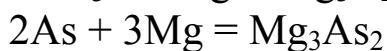
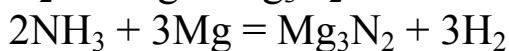
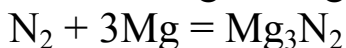
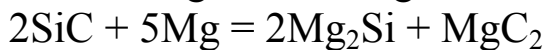
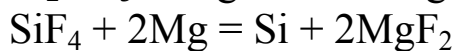
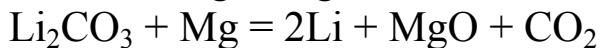
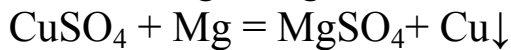
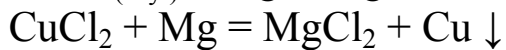
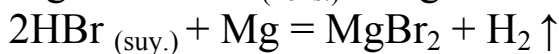
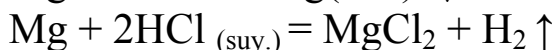
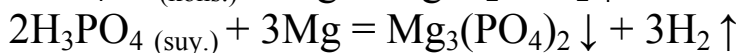
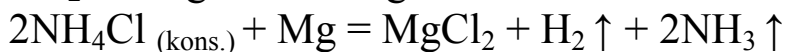
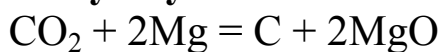
Qotishmalari. Magniy asosidagi Aluminiy, rux, marganes, sirkoniy, litiy, siyrak-yer elementlari va boshqa qoʻshilgan quyma va deformatsiyalanuvchi qotishmalar. Yengil konstruksion materiallar boʻlib, ularning zichligi $1,48-1,81 \text{ g/sm}^3$, ya'ni poʻlatga nisbatan 4 marta, Aluminiy va uning qotishmalariga nisbatan 1,5 marta kichik. Magniy qotishmasidan tayyorlangan detallarni kriogen va yuqori haroratlarda ishlatish mumkin. ML 4 (tarkibi 5,7% Al, 2-3% Zn, 0,15-0,5% Mn) va ML 5 (tarkibi 7,5-9,3% Al, 0,2-0,8% Zn, 0,15-0,5% Mn) markali qotishmalari keng qoʻllaniladi.

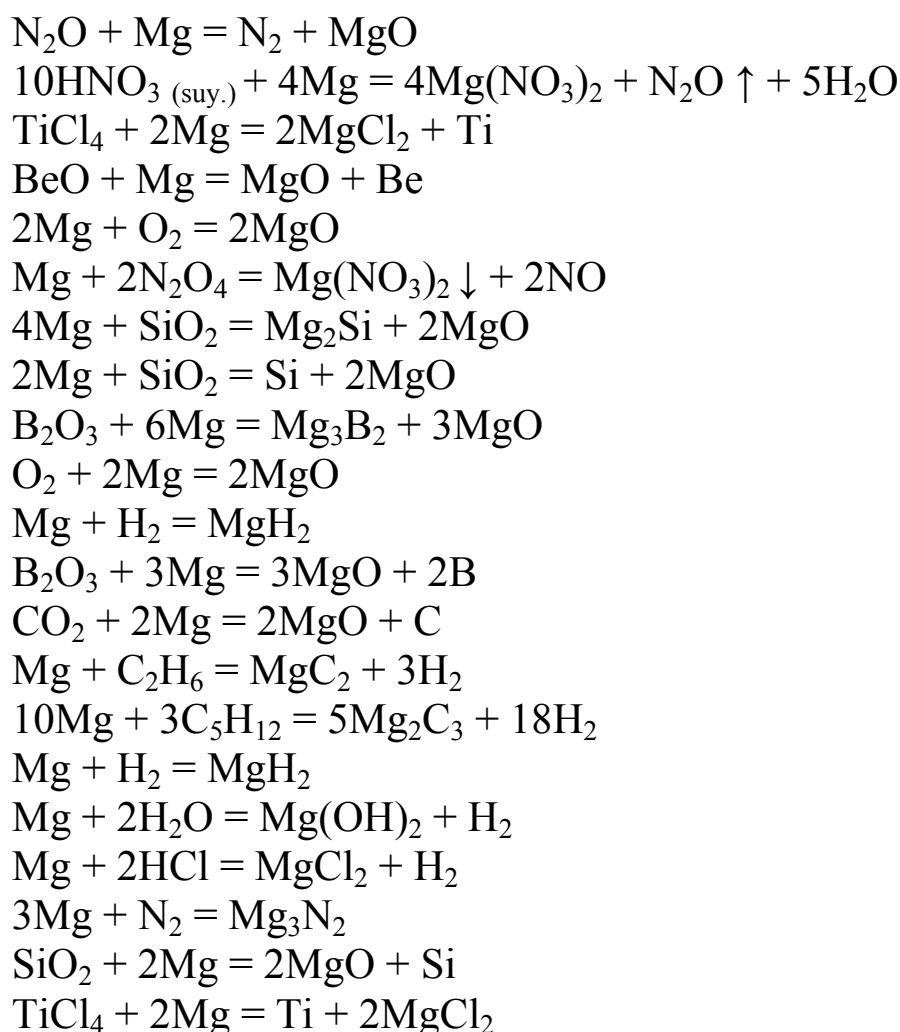
Olinishi. Magniy elektronik usul bilan olinadi. Unda mahsulot kuydirilib, soʻng xlorlanadi. Suvsiz boʻlgan xlorid - magniy elektroliz yordamida olinib, soʻng alohida tozalanadi va quyma shaklida ajratib olinadi.

Keyingi paytlarda uglerod yordamida qaytarilib olinish yoʻllari keng qoʻllanilmoqda. Shuningdek, oksidli yoki boshqa bir birikmada boʻlgan magniy faolroq boʻlgan metall (metallurgiya) yoki uglerod yordamida qayta tiklanib, termik usul bilan ham olinadi. Ergan karnallitni elektroliz

qilib, dolomitni metallotermik qaytarib va boshqa usullar bilan magniy olinadi.

Kimyoviy xossalari:





Aluminiy - Al

ALUMINIY:belgisi - **Al**. 1825-yilda fizik X.Ersted tomonidan kashf etilgan. 1827-yil Veler Aluminiyni metall holidagi kaliy ta'sir ettirish yo'li bilan ajratib olgan.

Davriy sistemaning III guruh kimyoviy elementi, Aluminiy lotincha "alumen" (aluminis)-achchiqtosh demakdir, tartib raqami 13, atom massasi 26,98154.

Aluminiy – kumushsimon-oq metall, yengil va bolg'alanuvchan, korroziyabardosh; zichligi 2,289 g/cm³; $t_{\text{suyuq}}=660^{\circ}\text{C}$, $t_{\text{qayn}}=2520^{\circ}\text{C}$. Yer qobig'ida 8,80 %.

Aluminiy bor, kumushdek oq, yengil, kub shaklidagi kristallik metall, havoda o'zgarmaydi, chunki usti yupqa oksid qavati bilan qoplangan bo'ladi. Metallar ichida tabiatda tarqalishi bo'yicha 1-o'rinni, amalda foydalanilishi bo'yicha esa 2-o'rinni (temirdan keyin) egallaydi.

Aluminiy konstruksiyalar qurilishda asosiy materiali Aluminiy qotishmalari yoki texnik Aluminiydan iborat bo'lgan konstruksiya va buyumlardir. Afzalligi: yengil, mustahkam, bezak uchun mosligi bo'lsa; kamchiligi esa: bir xil mustahkamlikdagi birikmalar (ayniqsa, payvandbirikmalar) olishning murakkabligi, Aluminiy qotishmalar elastiklik modulining pastligini (po'latga nisbatan taxminan 3 marta) hisobga olish zarurligidir. Aluminiy konstruksiyalar tayyorlashda yupqa (1mm dankam) metall list va presslangan yupqa devorli profillarda ishlatiladi.

Aluminiylash – metall buyumlarni korroziyadan saqlash, tashqi ko'rinishini yaxshilash, ularga maxsus fizik-kimyoviy xossa berish maqsadida ular sirtiga Aluminiy yoki ular asosidagi qotishmalarni yugurtirish. Diffuzion usul gaz-alangali va plazmali purkash, plakirovkalash, metallni vakuum ostida bug'latish, eritmaga botirish bilan amalga oshiriladi. Samolyot, raketa, avtomobil detallari, ro'zg'or buyumlari va boshqalar aluminiylanadi.

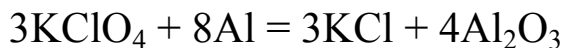
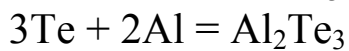
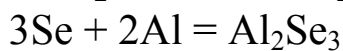
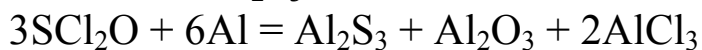
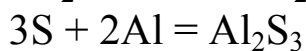
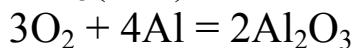
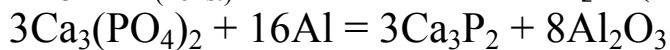
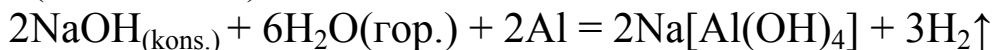
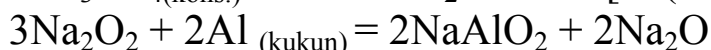
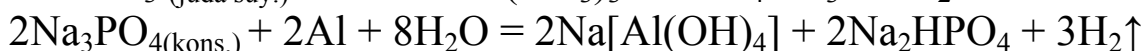
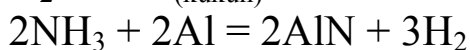
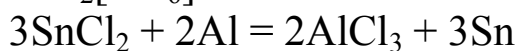
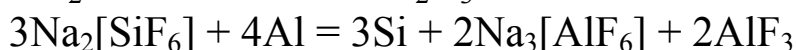
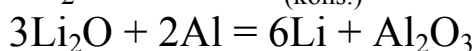
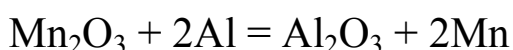
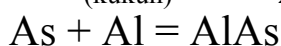
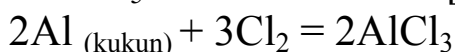
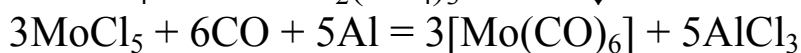
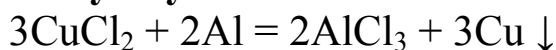
Minerallari. Turli minerallar ko'rinishida uchraydi. Shulardan boksit va alyumosilikatlar ko'p tarqalgan.

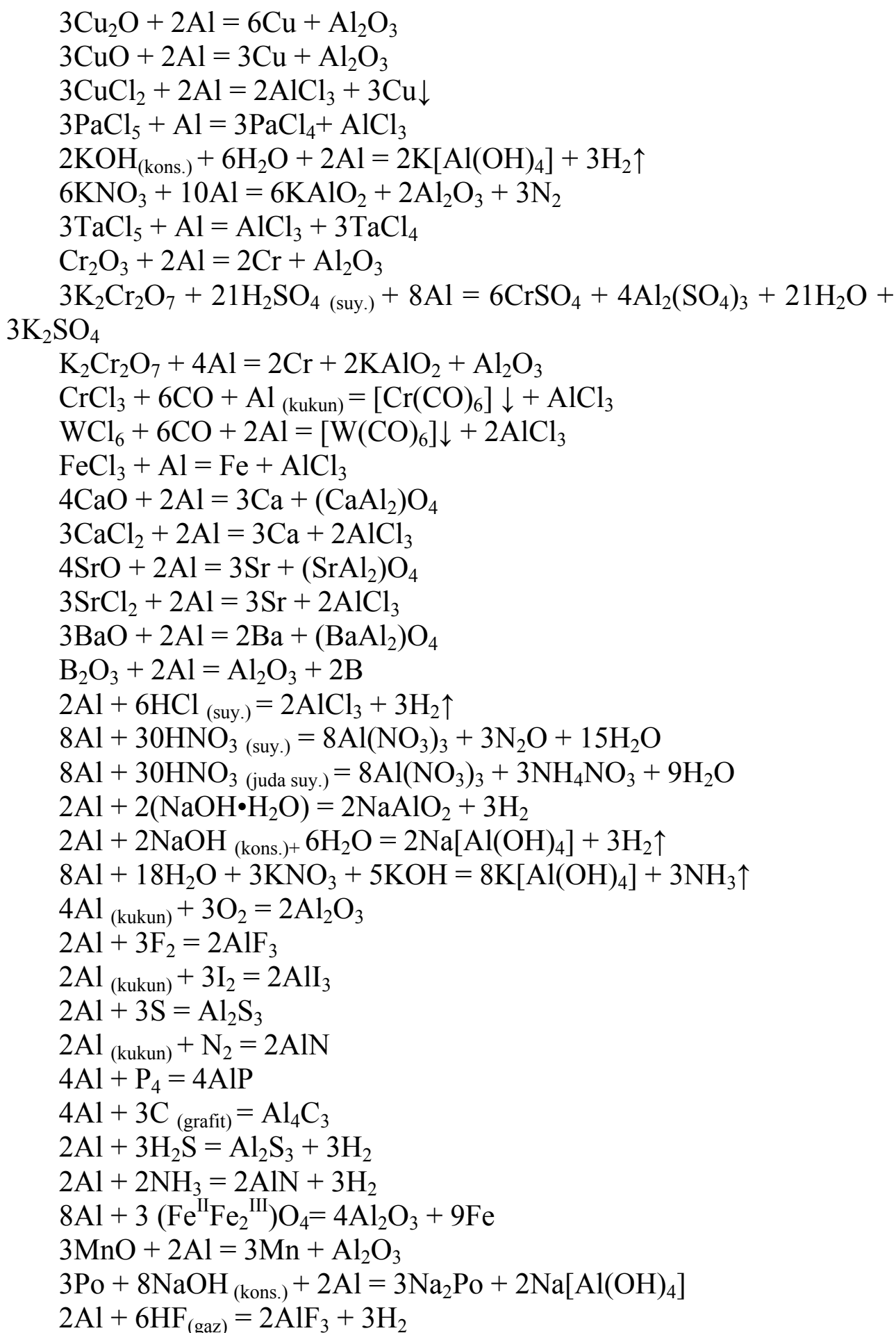
Ishlatilishi. Aluminiy oksidi - Al_2O_3 eritmasini erigan kriolit - Na_2AlF_6 da elektroliz yo'li bilan olinadi. Aluminiyning turli birikmalaridam keng ishlatiladi; masalan, aluminiyli achchiq tosh qadimdan gazmollarni bo'yashda, terini yaxshi oshlashda, bo'yoqni mustahkamlashda foydalanilgan. Aluminiy va aluminiy qotishmalari elektrotexnikada (elektr o'tkazuvchanligi yuqori), mashinasozlikda konstruksion material sifatida, aviasozlik, qurilish va boshqalarda ishlatiladi.

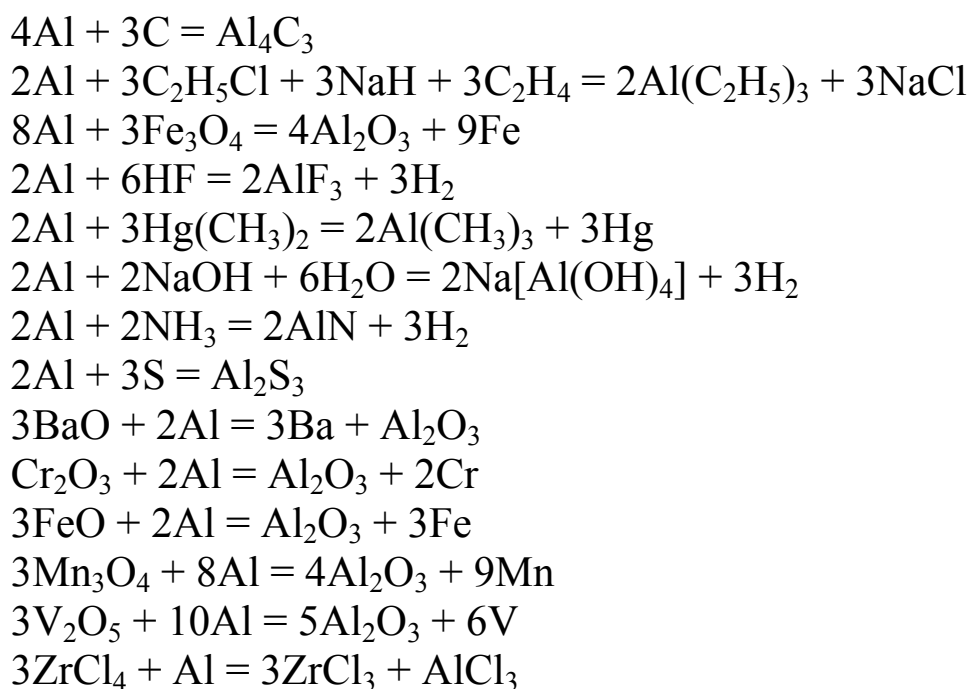
Qotishmalari. Aluminiy asosidagi mis, magniy, rux, kremniy, marganes, litiy, kadmiy, sirkoniy, xrom va boshqa qo'shimchali qotishmalari bor. Mexanik xossalari yuqori, zichligi kichik, elektr va issiqlik o'tkazuvchanligi yuqori, korroziyabardosh. Mashinasozlikning ko'p sohalarida, qurilishda, ro'zg'or buyumlari ishlab chiqarishda ishlatiladi. Ishlab chiqarish usullariga qarab, Aluminiy qotishmalarini deformatsiyalanadigan, quyma va termik ishlanadigan xillarga ajratish mumkin. Ishlab chiqarilish va ishlatilish hajmi bo'yicha qora metallardan keyin ikkinchi o'rinda turadi. Mis, magniy, titan, temir va boshqa asosidagi qotishmalarida Aluminiy eng ko'p tarqalgan legirlovchi qo'shilmalardan biri. Texnikadagi ko'pchilik metallar alyuminotermya usulida olinadi.

Olinishi. Barcha metallar ichida qazib olinishi bo'yicha temirdan keyin 2- o'rinda, rangli metallar ichida 1-o'rinda turadi. 250 dan ortiq minerallari mavjud. Chet elda Aluminiy asosan boksitlarni qayta ishlash yo'li bilan olinadi. Boksitning tarkibida Al_2O_3 - 35-60% gacha bo'ladi. Uni olish texnologiyasi: agar Aluminiyli ashyo qayta ishlansa, undan avval glinozyom olinadi, so'ng elektrolitik usul – avvaliga texnik toza Aluminiy rafinirlab tozalangach, o'ta toza aluminiy ajratib olinadi. Shuningdek, Bayer usuli bilan ham boksitlarni qayta ishlab toza Aluminiy olinadi.

Kimyoviy xossalari:







Kremniy – Si

KREMNIY: belgisi - Si. Davriy sistemening IV guruh kimyoviy elementi, (lot. Silicium “Silex” chaqmoq tosh soʻzidan olingan), tartib raqami 14, atom massasi 28,086. Kremniy kristallik panjarasi olmosnikiga oʻxshash boʻlgan, metalldek yaltiraydigan toʻq-kulrang kristall; zichligi $2,330 \text{ g/sm}^3$, $t_{\text{suyuq}}=1417^{\circ}\text{C}$.

Xona haroratida xususiy hajmiy solishtirma elektr qarshiligi 2,3 kOm. Amorf kremniyning zichligi $2,0 \text{ g/sm}^3$, $t_{\text{qayn}} = 2600^{\circ}\text{C}$; suvda erimaydi, HF va KOH da eriydi. Kristallik kremniy zichligi $2,4 \text{ g/sm}^3$, $t_{\text{suyuq}}=1423^{\circ}\text{C}$, $t_{\text{qayn}}=3250^{\circ}\text{C}$, HNO₃+HF da eriydi. Kremniy yer poʻsti massasining 27,1% ini tashkil etadi va silikatlar hamda kremnezyomlar koʻrinishida boʻladi.

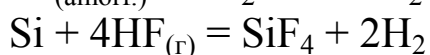
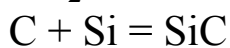
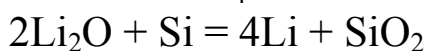
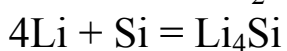
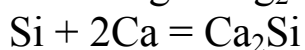
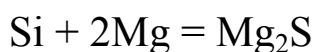
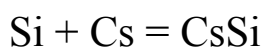
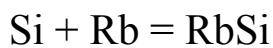
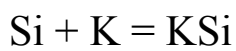
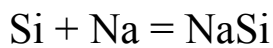
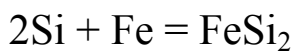
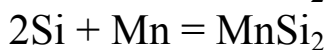
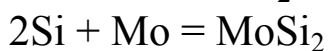
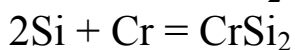
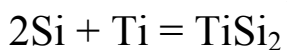
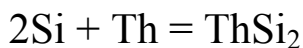
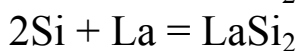
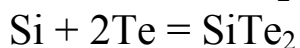
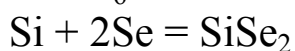
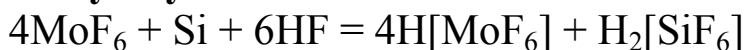
Minerallari. Chaqmoqtosh (kremen)- $x\text{SiO}_2 \cdot y\text{H}_2\text{O}$, bunda $x > y$ boʻlishi kerak, silanlar, silikat angidrid SiO_2 (kremnezyom). Tabiatda silikat angidridning bundan boshqa qum, kvars, kristobalit, opal, tridimit, leshatelerit kabi turli xillari uchraydi. Qum, qumtuproq kvarsdir. Tabiiy eng toza yirik kvars kristallari togʻ xrustali deyiladi.

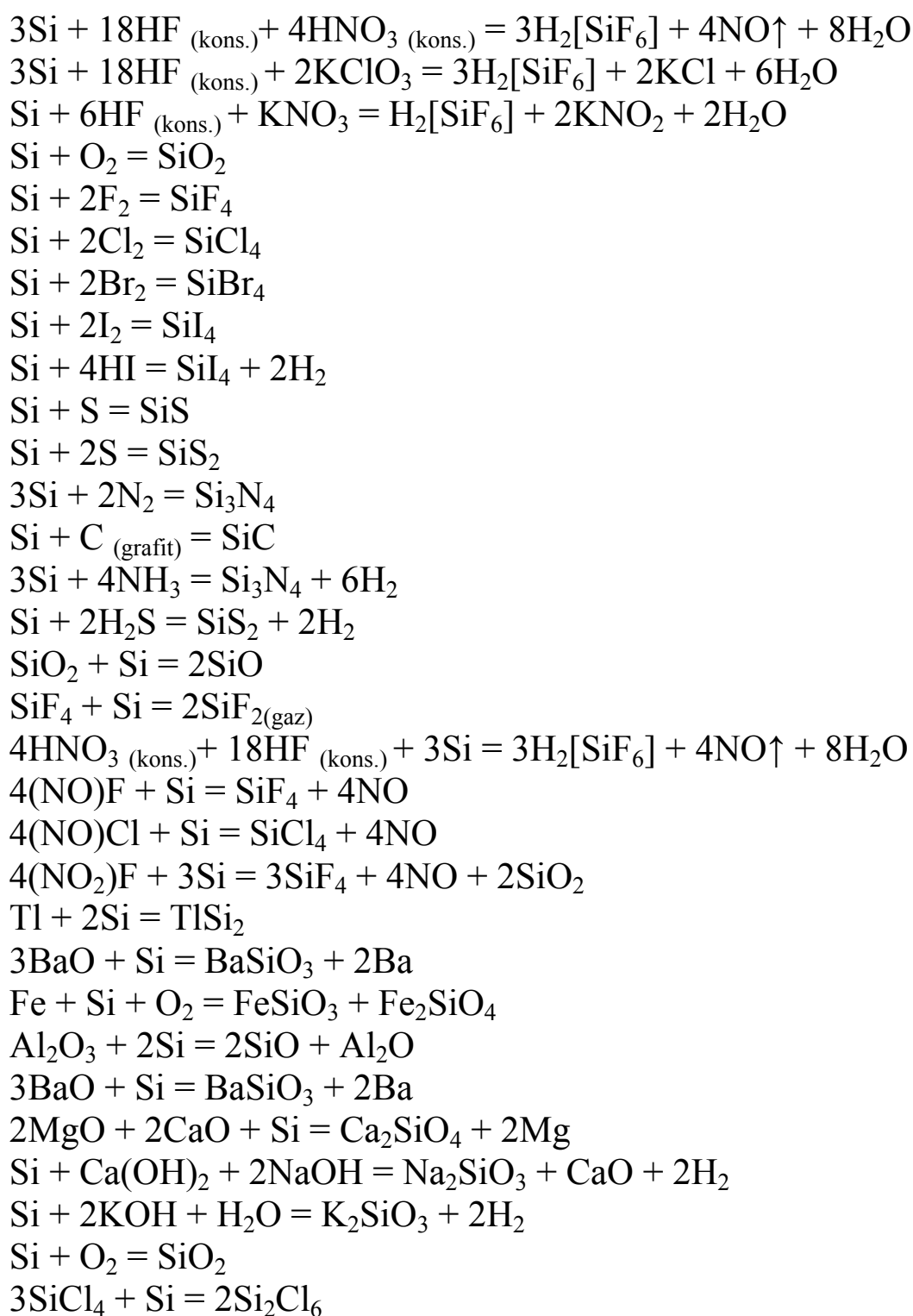
Ishlatilishi. Kremniy yarim oʻtkazgichli asboblarda tayyorlashda material sifatida ishlatiladi, metallurgiyada metallarni oksidsizlantirishda foydalaniladi, qurilishda va tibbiyotda ham ishlatiladi.

Qotishmalari. Kremniy temir va rangli metallarning ko'pgina qotishmalaritarkibiga kiradi, ularning quyuluvchanlik xossasini yaxshilaydi, korroziyabardoshligi va mexanik mustahkamligini oshiradi.

Olinishi. Kremniy ilk bor 1811-yilda J.L.Gey - Lyussak bilan L.J. Tenar tomonidan olingan. Erkin holda kremniy mayda oq qum (kremniy dioksid) ni magniy bilan qizdirib olinadi. Texnikada tetraxlor-silan- SiCl_4 dan ajratib olinadi. Texnik jihatdan toza kremniy SiO_2 ni grafitli elektrodlar orasida qaytarib elektr yoyida olinadi; toza kremniy tetraxloridni qaytarib, alohida toza kremniyni termik parchalab va SiH_4 ni zonali eritish yo'li bilan olinadi. Shuningdek, quyidagi qum tuproqni magniy bilan qaytarilish reaksiyasi bilan olinadi: $\text{SiO}_2 + 2\text{Mg} = \text{Si} + 2\text{MgO}$. Moddalar maydalangan aralashmasini yoqish bilan reaksiya boshlanadi. Magniy (II) oksidi va ortiqcha qumtuproqdan qutulish uchun mahsulot xlorid va ftorid kislotalar bilan yuviladi. Yana bir usul qumtuproq elektropechda ko'mir bilan qaytariladi: $\text{SiO}_2 + 2\text{C} = \text{Si} + 2\text{CO}$. Bunda hosil bo'lgan kremniy tarkibida 2-5 % aralashma bo'ladi.

Kimyoviy xossalari:





Fosfor – P

FOSFOR: belgisi - P. 1669-yilda kashf etilgan. Yunoncha “Phosphoros” yorug‘lik tashuvchi demakdir, davriy sistemaning V guruh kimyoviy elementi, tartib raqami 15, atom massasi 30,97376. Fosfor asosan uch allotropik modifikatsiya holida uchraydigan metallmas

element. Fosforning bir necha allotropik shakl o'zgarishlari bor: oq fosfor, qizilfosfor, binafsharang fosfor, qora fosfor.

Fosfor - oq yoki sariq (aralashmalar tufayli) rangli kristall, qizil fosfor- amorf kukun; zichligi $2,300 \text{ g/sm}^3$ atrofida, $t_{\text{suyuq}}=92,01^{\circ}\text{C}$; $t_{\text{qayn}}=280,5^{\circ}\text{C}$. Qora fosfor ko'rinishi va tuzilishi bo'yicha grafitga o'xshaydi. Oq fosfor kimyoviy jihatdan ancha faol (qizdirishda, ishqalashda o'z-o'zidan alangalanadi), qora fosfor esa uncha faol emas.

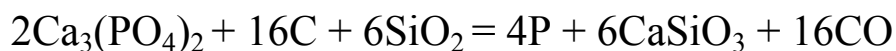
Fosfor birikmalari o'simlik va hayvonlar hayotida muhim rol o'ynaydi; ular ba'zi oqsil modda (shuningdek, asab va miyahujayralari), ferment, vitaminlar tarkibiga kiradi. Fosfor o'simlik va hayvon organizmining oqsil moddalarida uchraydi, o'simliklarning donlaridagi, hayvonlarning sut, qon, miya va asab sistemasi oqsillarida bo'ladi, suyakda fosfor - $\text{Ca}_3(\text{PO}_4)_2$ birikmasi holida bo'ladi.

Minerallari. Tabiatda fosforit $\text{Ca}_3(\text{PO}_4)_2$ va apatitlar $\text{Ca}_3(\text{PO}_4)_2 \cdot \text{CaCl}_2$ (yoki CaF_2) tarkibida uchraydi.

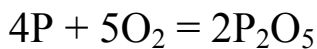
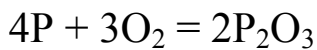
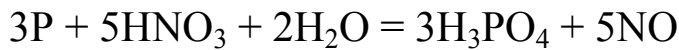
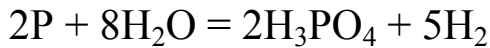
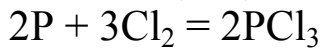
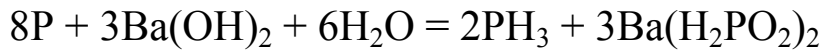
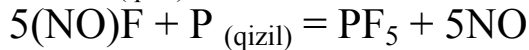
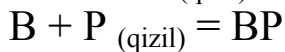
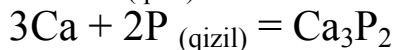
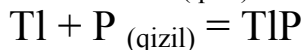
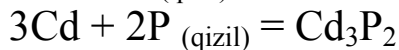
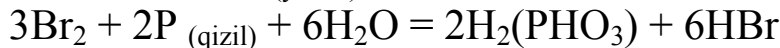
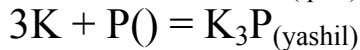
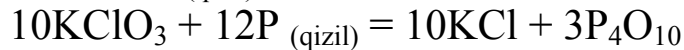
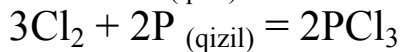
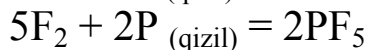
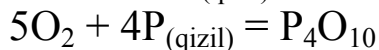
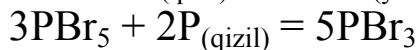
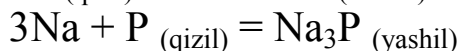
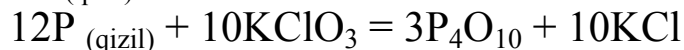
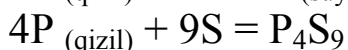
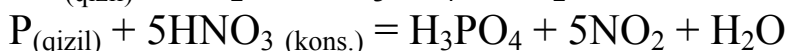
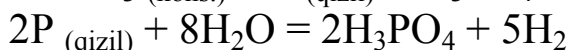
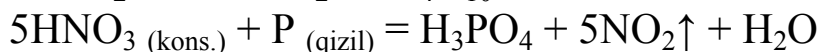
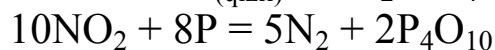
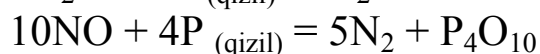
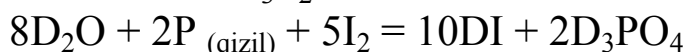
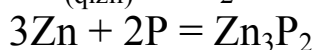
Ishlatilishi. Fosfor asta-sekin oksidlanganda nurlanadi (nomi shundan). Oq fosfor juda zaharli, yomon kuydiradi. Apatitlar va fosforitlar fosforning asosiy xomashyosidir. Fosforning ko'pchilik qismi fosforli o'g'itlar tayyorlash uchun sarflanadi. Fosfor metallurgiyada oksidsizlantirgich va ba'zi qotishmalarning komponentlari sifatida qo'llaniladi. Ko'pincha qizil fosfor gugurt ishlab chiqarishda ishlatiladi. Birinchi va ikkinchi jahon urushi davrida oq fosfor yondiruvchi bomba va to'p snaryadlari tayyorlashda ishlatilgan.

Qotishmalari. Elektrotermik usulda fosforning sariq rangli qotishmasi olinadi.

Olinishi. Fosforit birikmalarini qayta ishlash jarayonida erkin holda fosfor ajratib olinadi. Tabiiy fosforit yoki apatit yanchilib, qum va ko'mir bilan aralashtiriladi. Pechlarda elektr toki yordamida havokiritilmasdan nakalka qilinadi. Yuqori haroratda kremniy dioksidi fosforangidridini siqib chiqaradi va kalsiy oksid bilan birikib, yengil eruvchi kalsiy silikatini hosil qiladi, ko'mir yordamida fosfor angidridi esa erkin holdagi fosforga qaytariladi. Fosfor bug' holida ajraladi va suv ostida kondensatsiyalanadi. Shuningdek, uning birikmalari fosforit va apatitdan olinadi. Fosfor olish uchun maydalangan tabiiy fosforit, qum (kvars) ishtirokida elektrpechda koks bilan qaytariladi. Hosil bo'lgan fosfor bug'lari suv ostida oq fosfor ko'rinishda kondensatsiyalanadi.



Kimyoviy xossalari:



Oltingugurt - S

OLTINGUGURT:belgisi - S. Oltingugurt bilan insoniyat qadimdan tanish. (Sulfur, lotincha och sariq degan soʻz), davriy sistemaning VI guruh kimyoviy elementi, tartib raqami 16, atom massasi 32,064, qattiq moʻrt sariq modda, bir necha allotropik shakl oʻzgarishlari bor. Odatdagi sharoitda oktaedrik (rombik). Oltingugurt barqaror difosfor tabiatda rombik oltingugurt uchraydi. Oltingugurt zichligi $2,07\text{g}/\text{sm}^3$, $t_{\text{suyuq}}=112,8^{\circ}\text{C}$, $t_{\text{qayn}}=444,6^{\circ}\text{C}$; elektr oʻtkazmaydi, suvda deyarli erimaydi, uglerod sulfidda, benzolda va toluolda eriydi. $95,5^{\circ}\text{C}$ dan yuqorida prizmatik (monoklinik) oltingugurt barqarordir. Yana amorf oltingugurt ham bor.

Minerallari. 1-2 oltingugurt moʻrtidir. Uning ulanish tekisligi $\{001\}$ $\{110\}$ va $\{111\}$ boʻyicha mukammal emas. Solishtirma ogʻirligi 2,05-2,08. Elektr va issiqlik oʻtkazuvchanligi juda kuchsiz (yaxshi izolyator) dir. U ishqalanish natijasida manfiy elektr bilan zaryadlanadi va qoʻl issiqligidan yorilib-yorilib ketadi.

Oltingugurt oʻziga xos rangi, kichik qattiqligi, moʻrtligi, kristallarning singan joyida yogʻdek yaltirashi va oson eruvchanligi bilan xarakterlidir. Dahandam alangasida va gugurt yoqqanda ($112,8^{\circ}\text{C}$ da) oson eriydi hamda koʻk alanga bilan oʻziga xos xid SO_2 chiqarib yonadi (oʻziga oʻxshash auripigment As_2S_2 dan farqi). Oltingugurt uglerodda, skipidarda, kerosinda eriydi, lekin HCl va H_2SO_4 da parchalanmaydi. Kuchli HNO_3 va oltingugurti oksidlantirib H_2SO_4 ga aylantiradi.

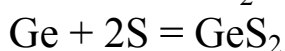
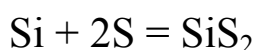
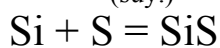
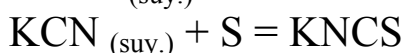
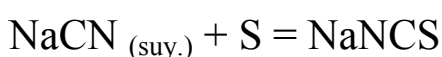
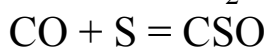
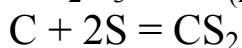
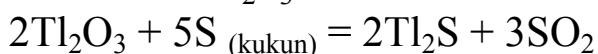
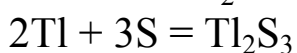
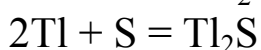
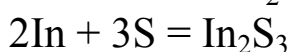
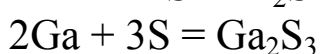
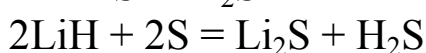
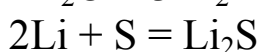
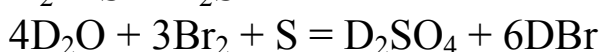
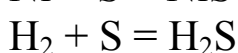
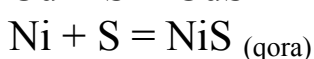
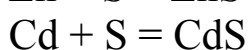
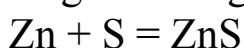
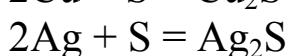
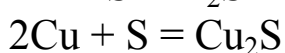
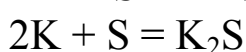
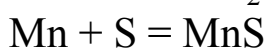
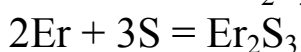
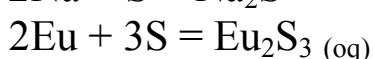
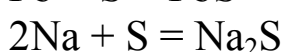
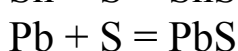
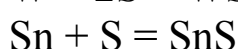
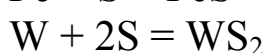
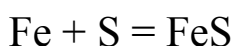
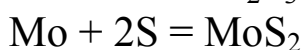
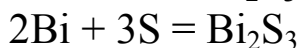
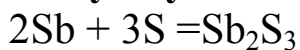
Ishlatilishi. Oltingugurt, asosan, sanoatning koʻpgina tarmoqlari uchun zarur boʻlgan sulfat kislotasi ishlab chiqarish uchun qishloq xoʻjaligida (zararkunandalarga qarshi kurashda), rezina sanoatida (vulkanizatsiyalash jarayonida), gugurtlar, mushaklar, boʻyoqlar va boshqalar ishlab chiqarishda qoʻllaniladi. Kimyo laboratoriyalarida, qishloq xoʻjaligida, kauchukni vulkanlashda, tibbiyotda ishlatiladi.

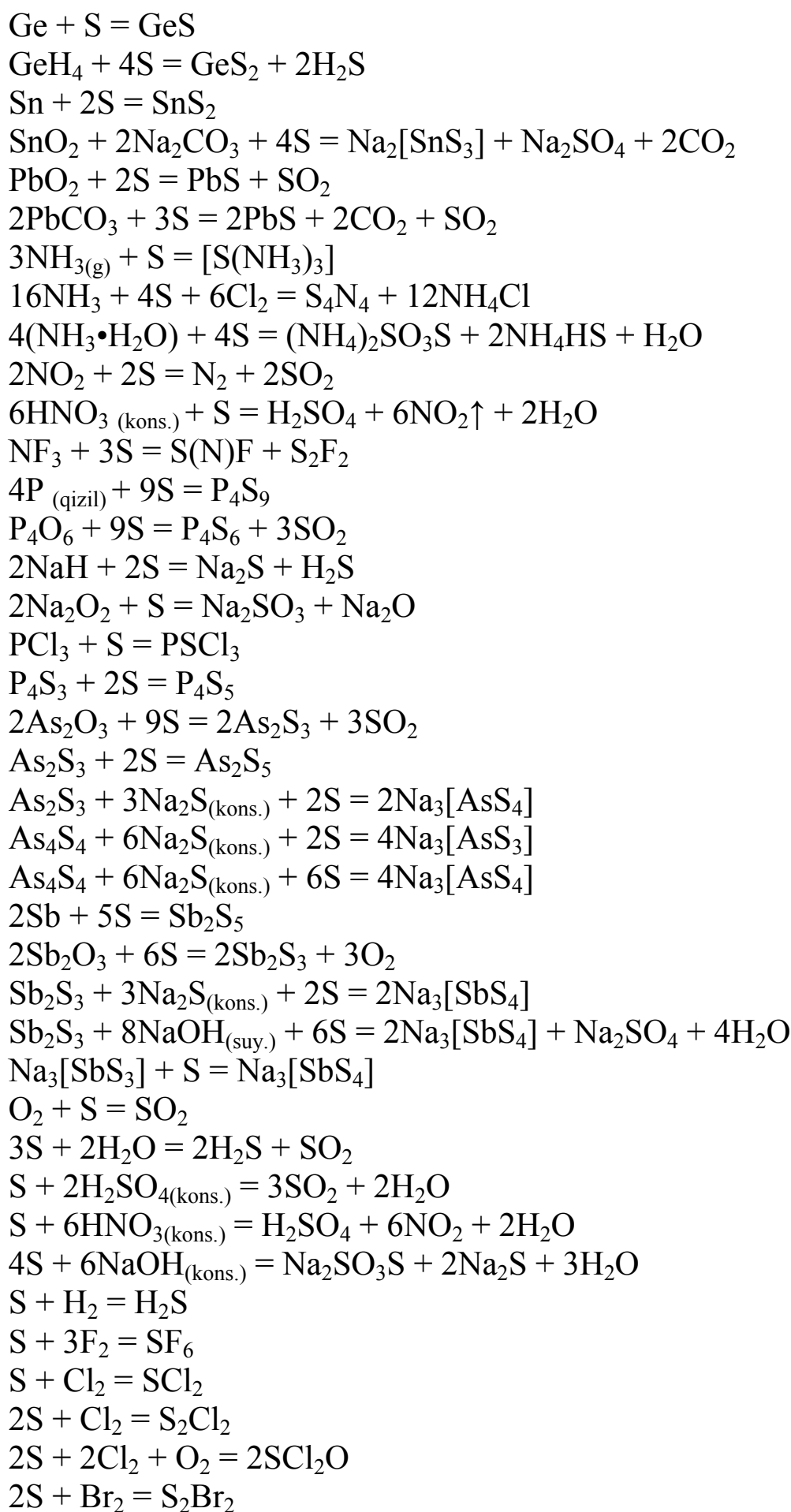
Qotishmalari. Oltingugurt metallar tarkibida kam konsentratsiya miqdorida qotishmada ishtirok etadi.

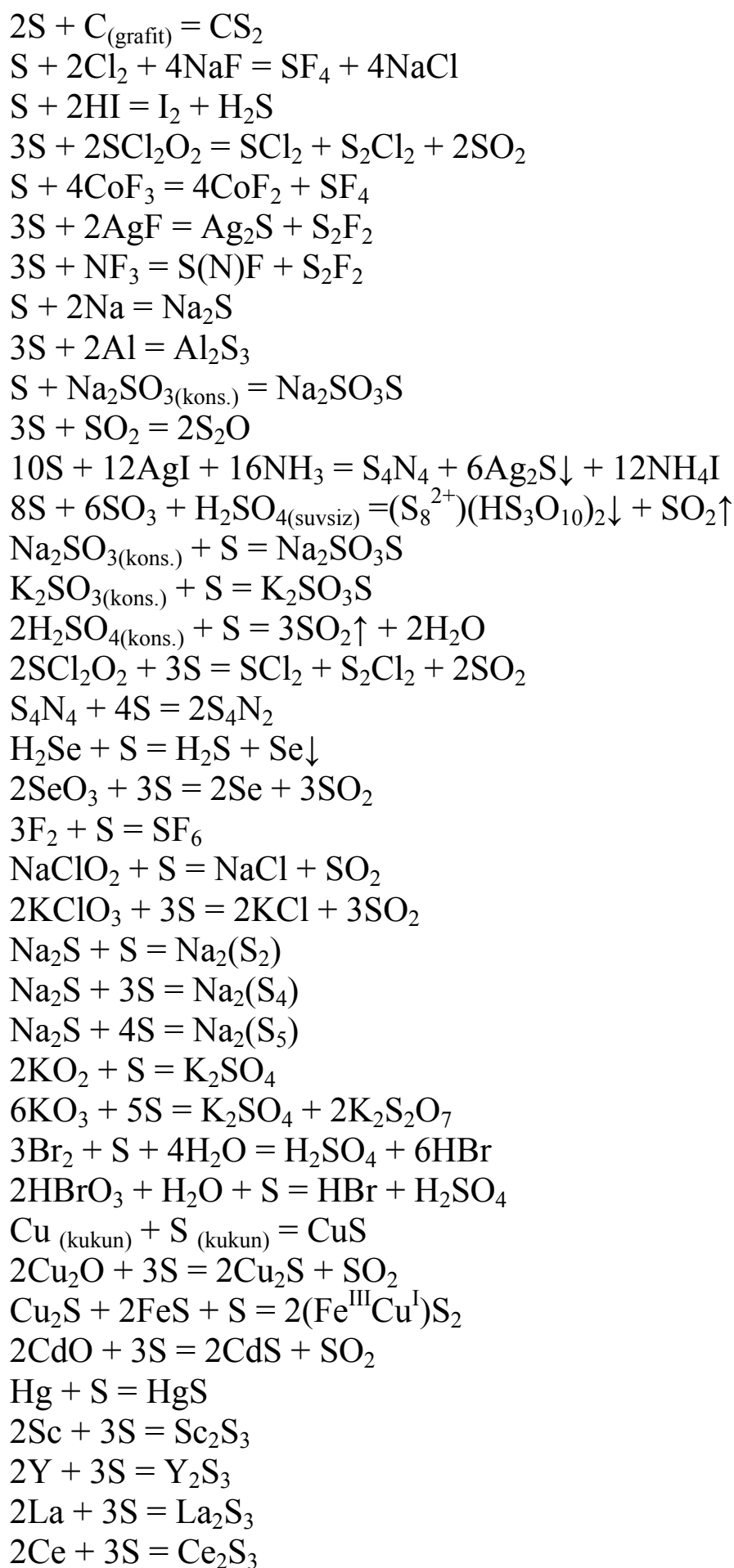
Olinishi. Tarkibida kolchedanlar va metall yaltiroqlari boʻlgan rudalar boyitiladi. Boyitilgan konsentrat qaynoq xlorid kislotada ishlanadi. Oltingugurt vodorod sulfid holida ajratib yondiriladi va oltingugurt (VI) - oksid taʼsirida qaytarib, ajratib olinadi. Tabiiy gaz va oltingugurt tarkibli birikmalarini qayta ishlash texnologiyasida erkin holda oltingugurt olinadi.

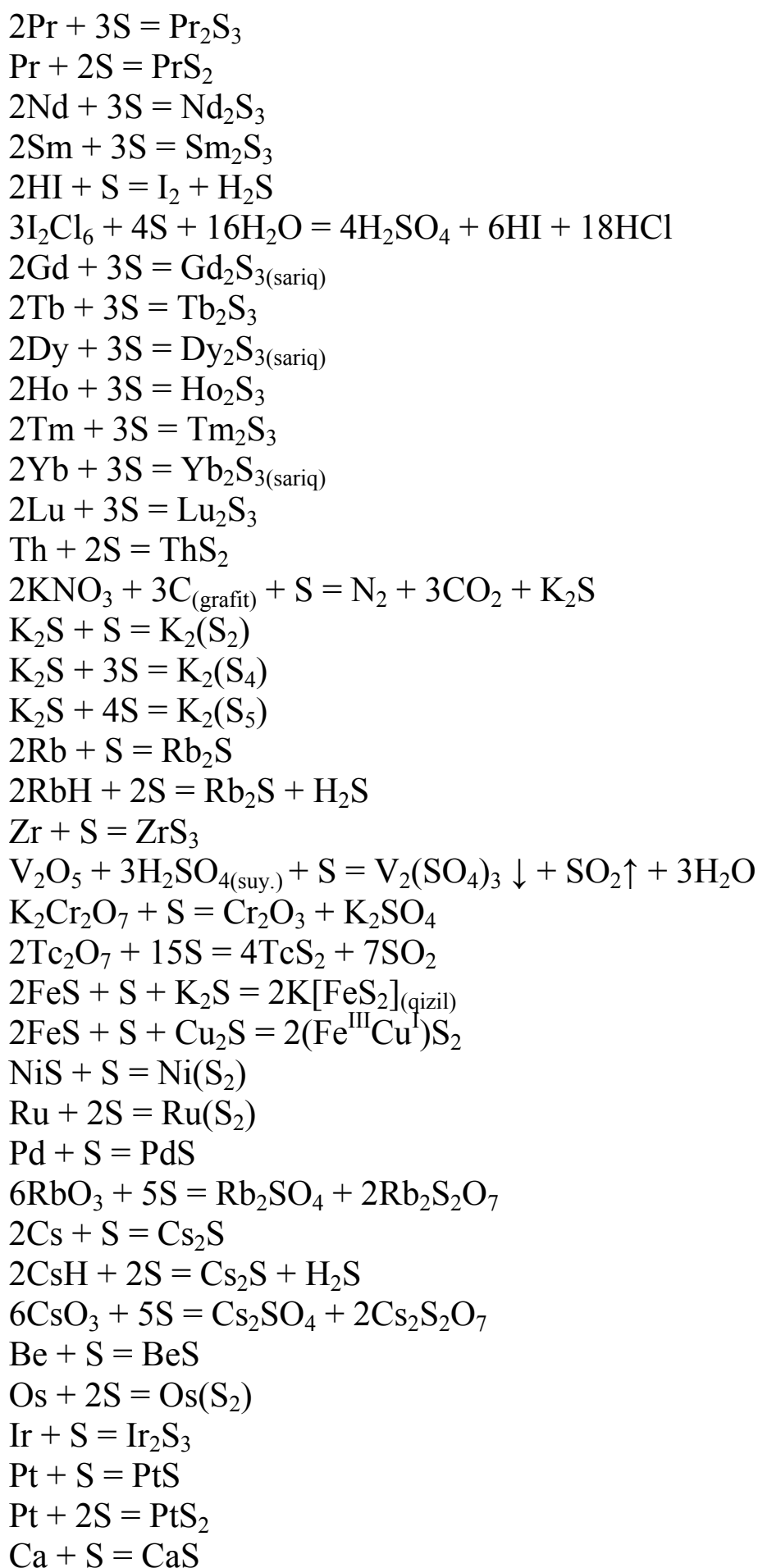
Shuningdek, oltingugurt asosan konlardan qazib olinadi. Vodorod sulfidi rudalar va boshqalar yoqilganda hosil boʻladigan gazlardan olinadi. Oltingugurt uniga aralashgan turli moddalardan haydab tozalanadi. Oltingugurt bugʻini tez sovutib kukunsimon oltingugurt olinadi.

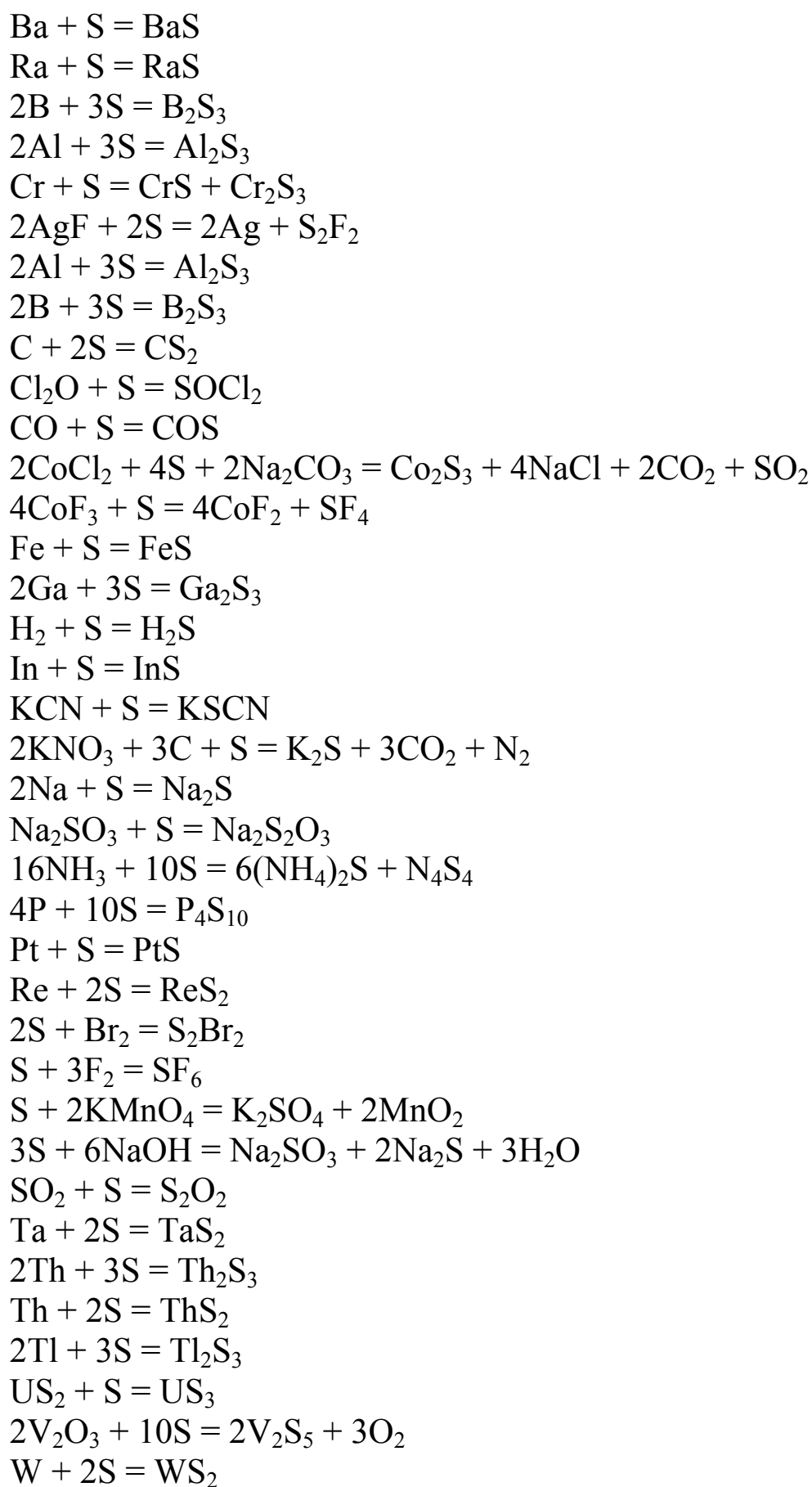
Kimyoviy xossalari:











Xlor - Cl

XLOR:belgisi - Cl.(Chlorum yunon. “chloros” – och yashil, sarg‘ish-yashil, lot. Chlorum) davriy sistemaning VII guruh kimyoviy elementi, tartib raqami 17, atom massasi 35,453 zichligi 3,2 g/sm³, t_{qayn}= -33,6⁰C; och yashil-sariq o‘tkir hidli bo‘g‘uvchi gaz; d 2,4910⁰C (havoga nisbatan); galogenlar guruhiga mansub, kritik harorati 146⁰C, kritik bosimi 93,5 at, t_{qayn}=-34,1⁰C, t_{qot}= -101,0⁰C; 15⁰C va 2 atmosferada yoki -39,6⁰C va atmosferada suyuqlanadi; bir hajm suvda 2 hajm xlor eriydi; zaharli; nafas yo‘llariga va shilliq pardalarga ta’sir etadi, uning suvdagi eritmasi xlorli suv deyiladi, faol metallmas. Odatdagi haroratda bosim ostida yengil suyuqladi.

Xloridlar - xlorning boshqa elementlar bilan birikmasi, masalan, natriy xlor NaCl - osh tuzi. Xlorli ohak - oqartiradigan ohak.

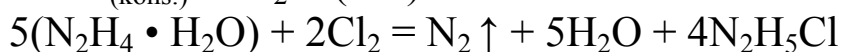
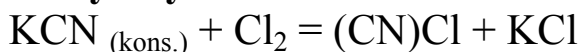
Minerallari.Tabiatda quyidagi minerallar tarkibida uchraydi: osh tuzi NaCl, silvinit NaCl·KCl, karnallit KCl·MgCl·6H₂O va boshqa ko‘rinishda keng tarqalgan. Xlorning juda ko‘p tuzlari okean, dengiz, daryo va ko‘l suvlarida erigan bo‘ladi.

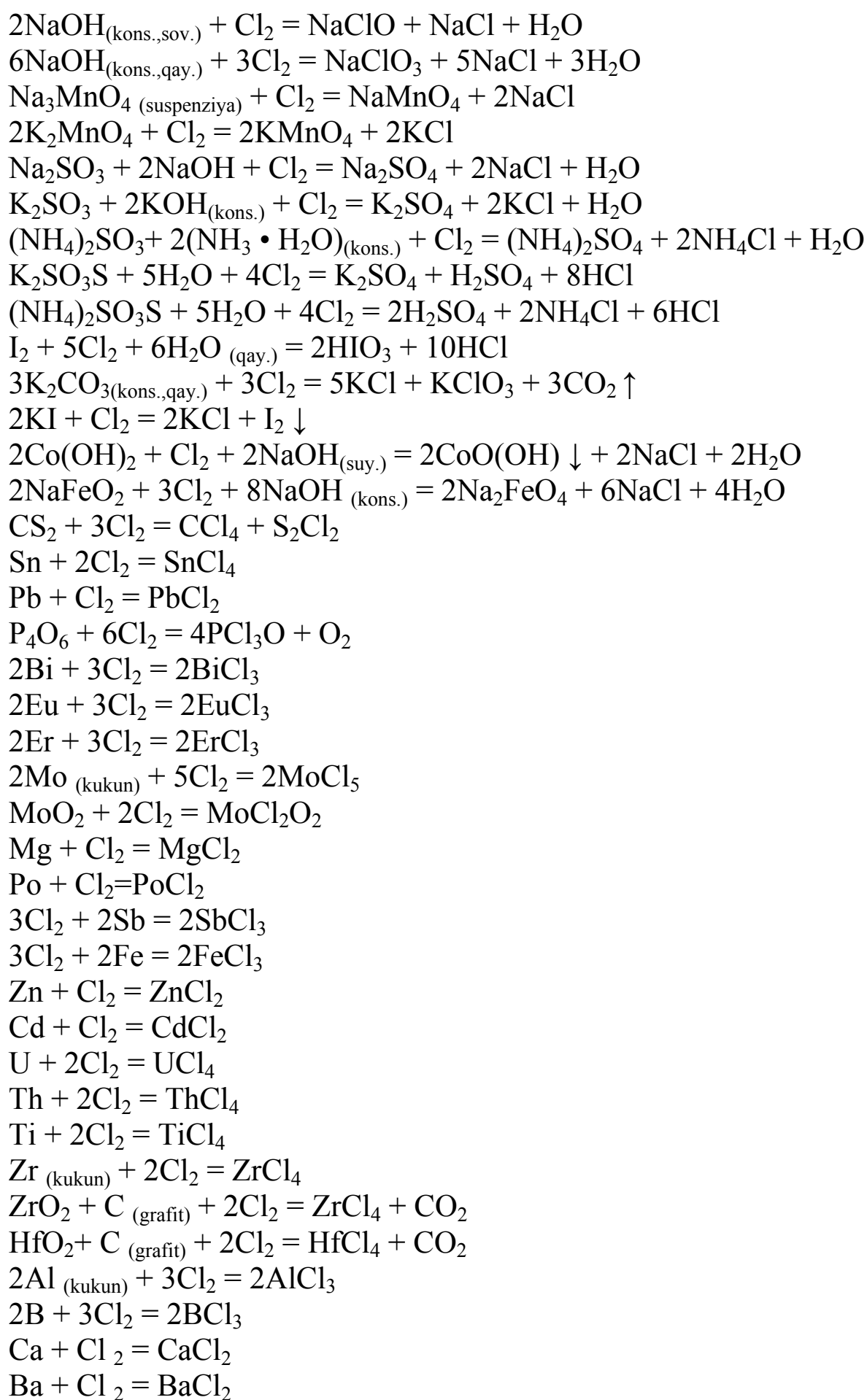
Ishlatilishi. Suvlarni dezinfeksiyalashda, qishloq xo‘jaligi zararkunandalariga qarshi kurashda va kimyo laboratoriyalarida ishlatiladi. Xlor olinadigan polimerlar (polixlor-vinil, xloroprenli kauchuk, xlor tolasi va boshqa) ni sintezlashda ishlatiladi; suvni zararsizlantirish (xlorldash) da, gazlama va qog‘oz massasini oqlashda foydalaniladi, xlor qog‘oz va to‘qimachilik sanoatida qog‘oz va matolarni oqartirish uchun ishlatiladi.

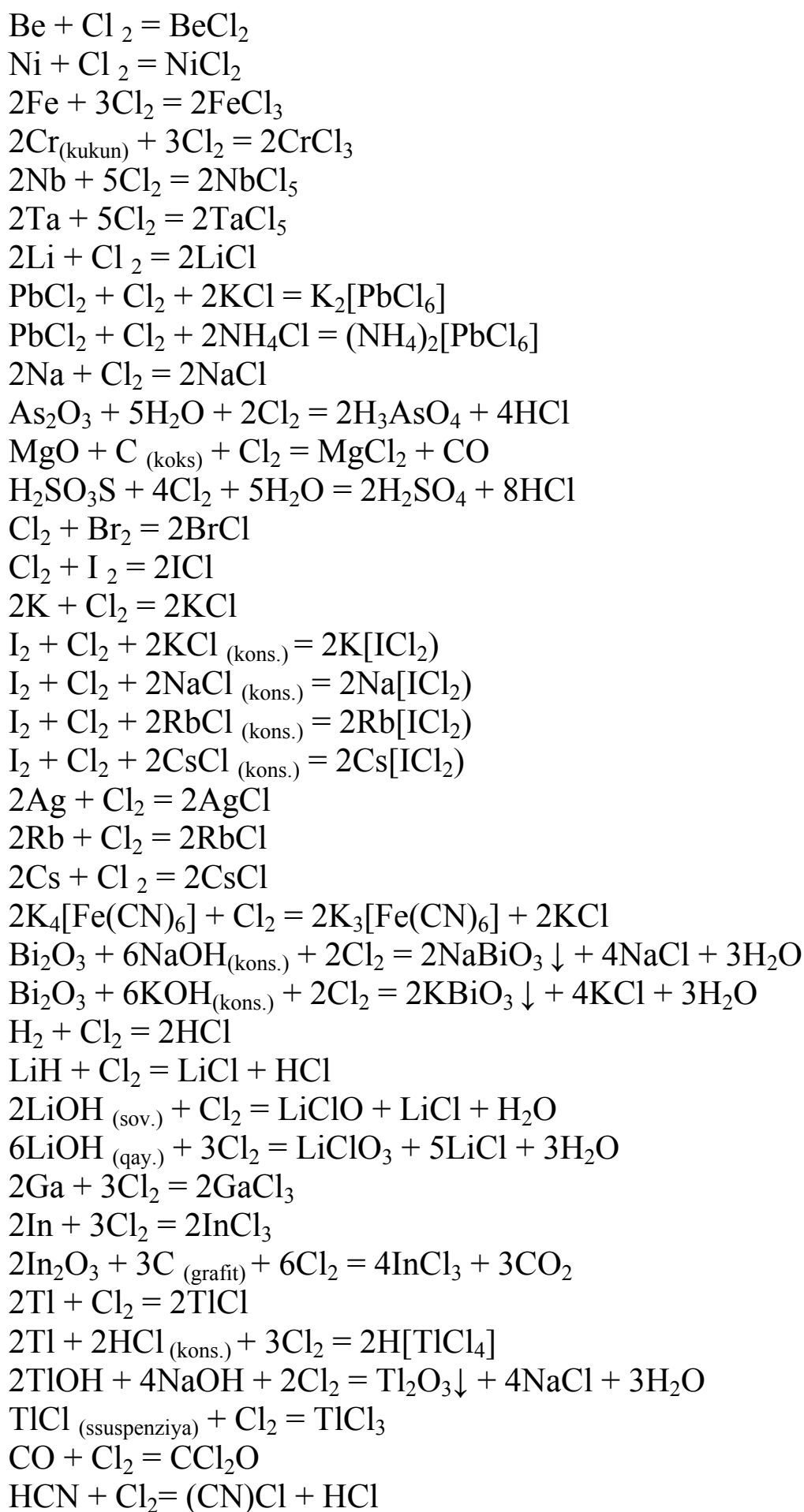
Olinishi. Sanoatda xlor olinishining bir necha usullari mavjud.

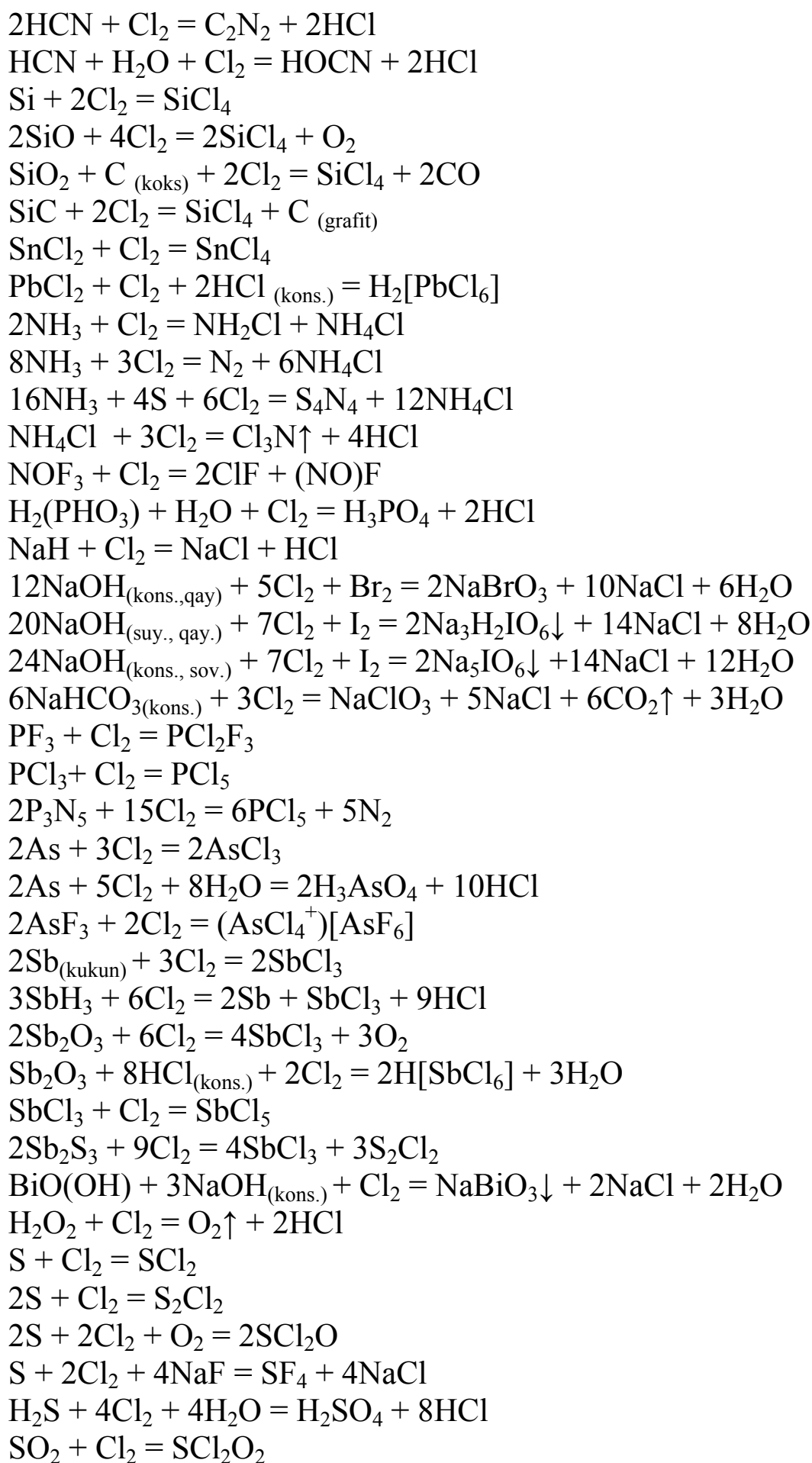
Natriy xloridning suvli eritmasini elektroliz qilganda anodda erkin xlor ajralib chiqadi. Shu jumladan, oltin (II) xloridli termokimyoviy parchalanishdan xlor olinadi. Xlor olishning asosiy usuli - KCl eritmalarini elektroliz qilish. Anorganik va organik mahsulotlarni, shu bilan birga vodorod xlorid, xlorli ohak, xloridlar, insektitsidlar, bo‘yoq moddalari,shuningdek, 60-70% zaharli; nafas olish yo‘liga kuchli ta’sir qiladi. Havodagi ruxsat etilgan konsentratsiyasi 1 m g/sm³.

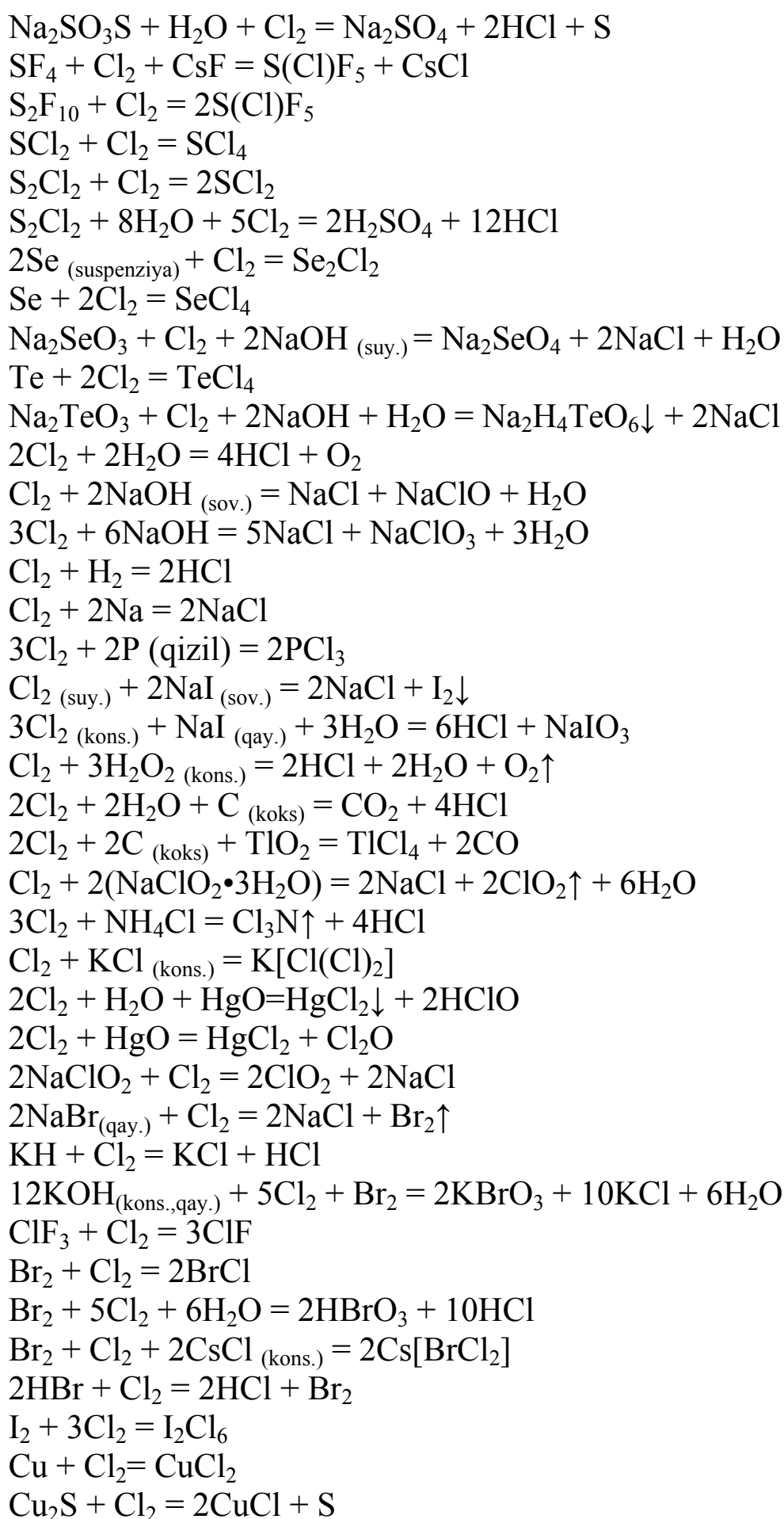
Kimyoviy xossalari:

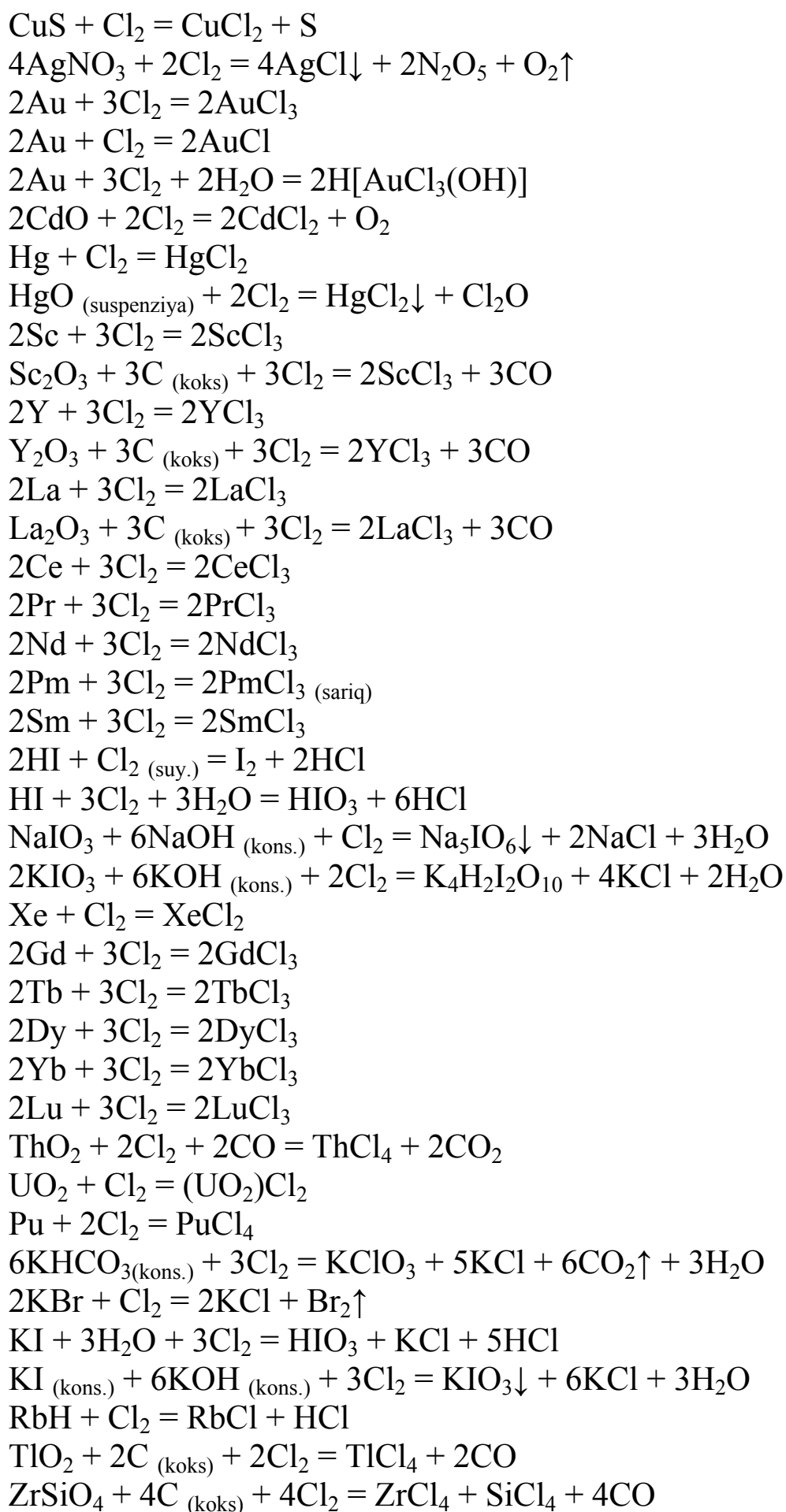


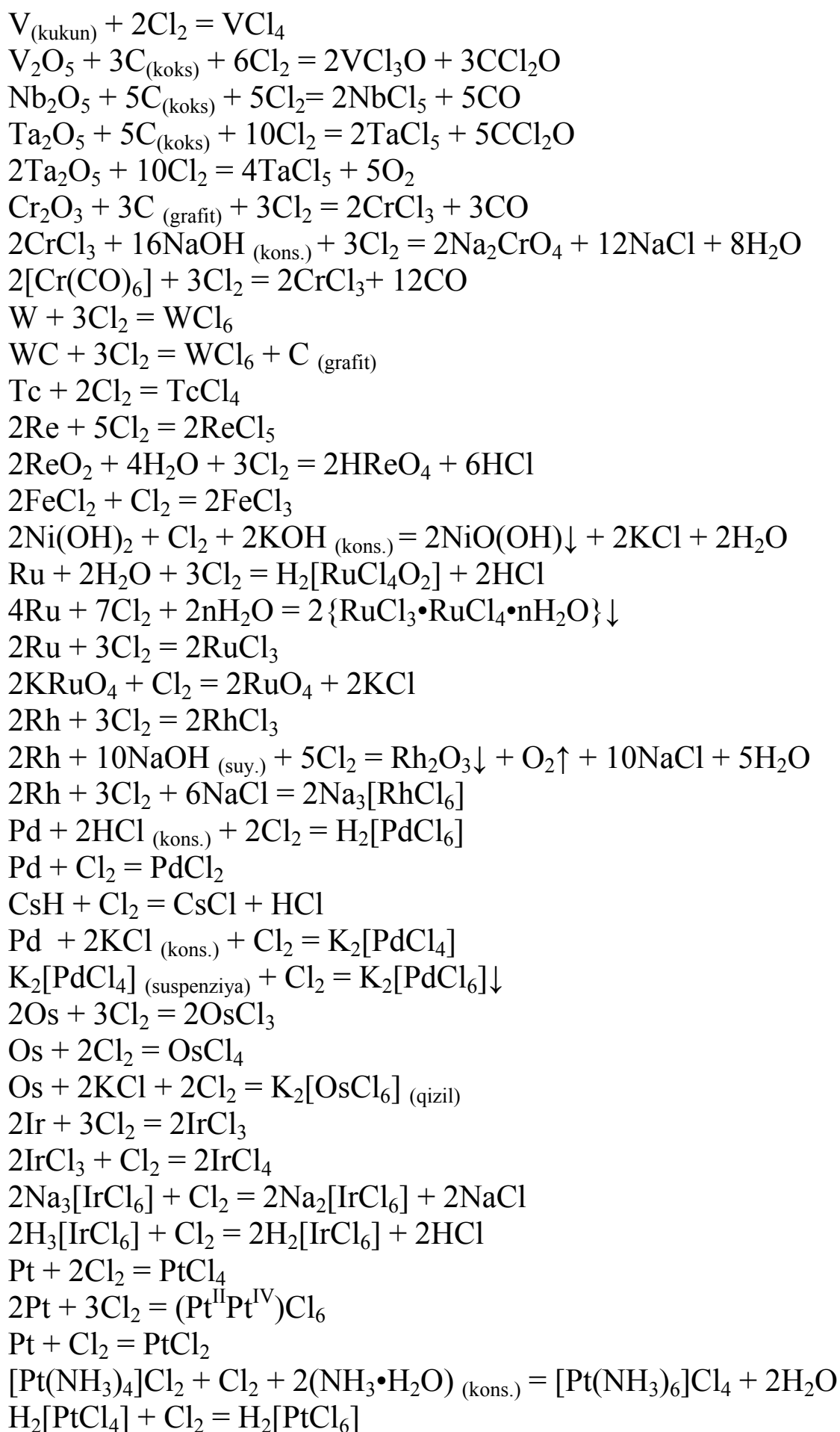


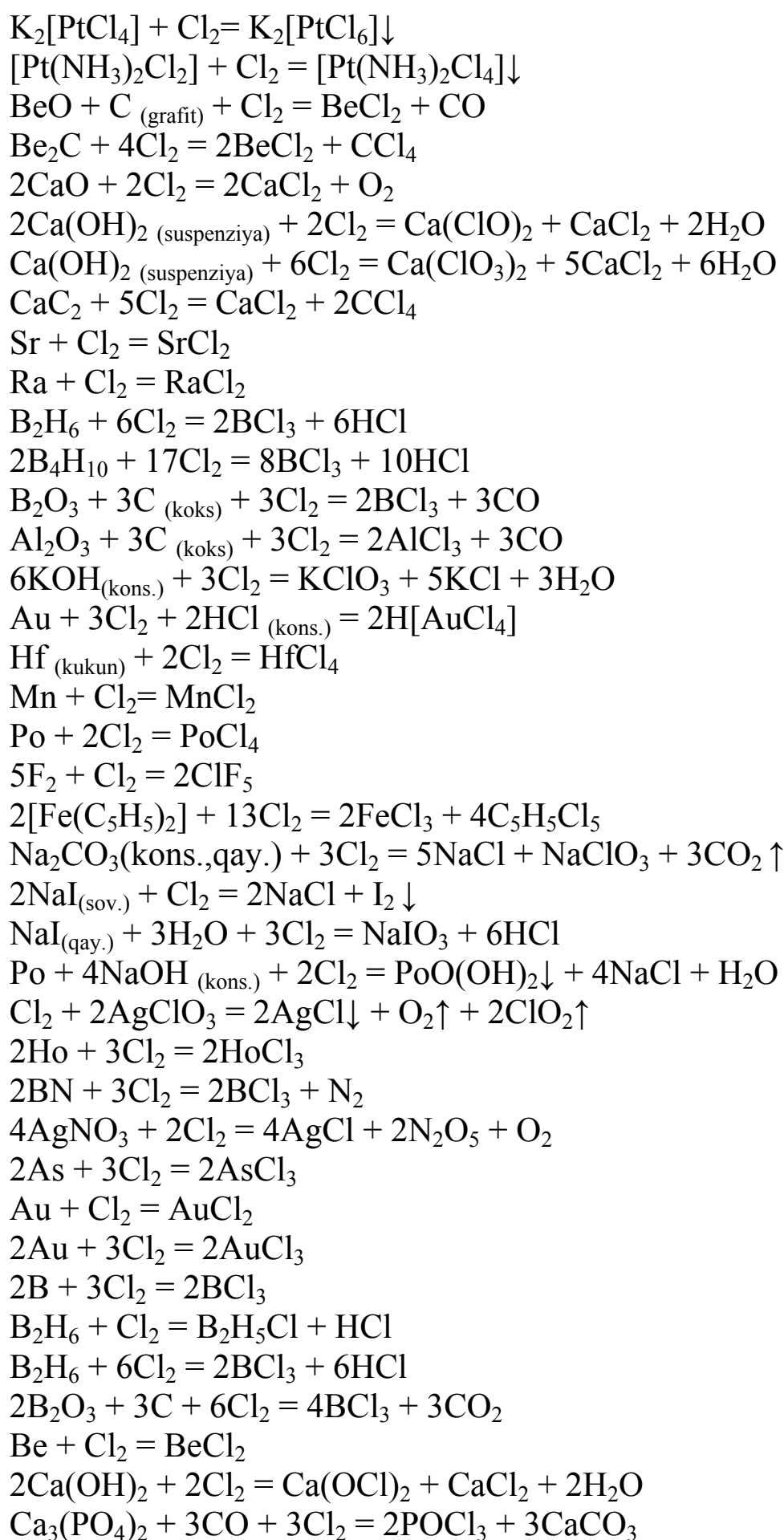


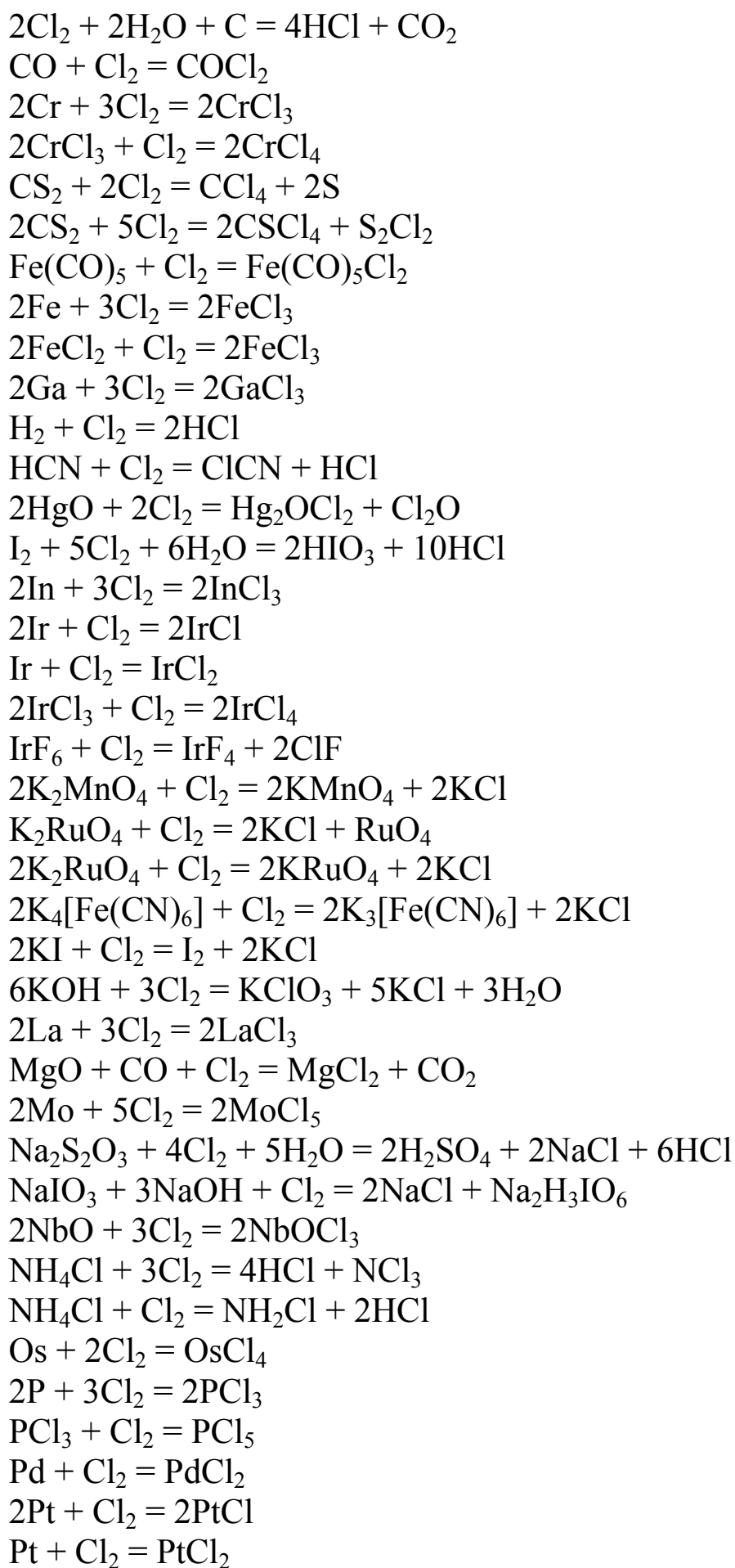


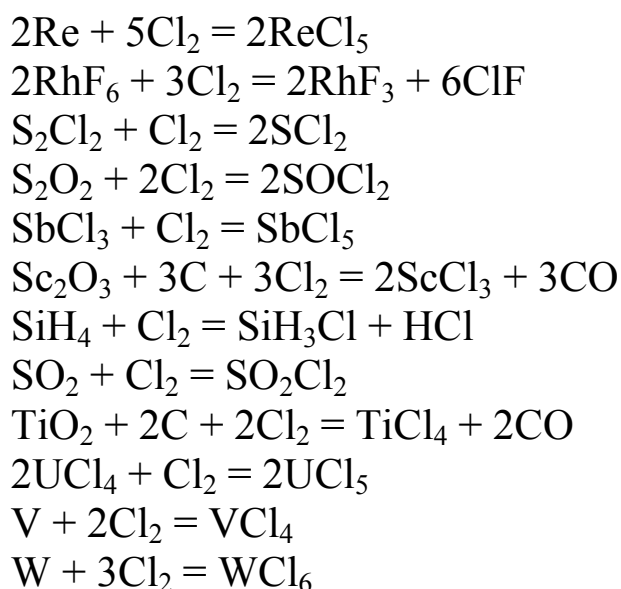












Kaliy - K

KALIY: belgisi - **K**. 1807-yilda K. Deviy tomonidan kashf etilgan. Yer qobig'ida 2,5% ni tashkil etadi. (Calium ismi arabcha dualjan - kul so'zidan olingan), davriy sistemaning I guruh kimyoviy elementi, tartib raqami 19, atom massasi 39,102; kumushrang kubik kristall metall, zichligi 0,8621g/sm³; yumshoq, oq kumushsimon metall, $t_{\text{suyuq}}=63,5^{\circ}\text{C}$; $t_{\text{qayn}}=757,5^{\circ}\text{C}$ (762,2⁰C). Kaliy ancha faol metall bo'lganligi uchun barcha metallmaslar bilan oson ta'sirlashadi. Kaliy havoda tez oksidlanadi va suv bilan reaksiyaga kirishib, vodorod ajratib chiqaradi.

Minerallari. Kaliy birikmalari qadimdan ma'lum bo'lsada, erkin holda tabiatda faqat birikma holida uchraydi; silvin, silvinit, karnallit, kainit va boshqalar.

Ishlatilishi. Qishloq xo'jaligida kaliy silitrasi qora porox tayyorlashda, shisha ishlab chiqarishda, go'shtni konservalash, bo'yoqchilik, farmatsevtika va tibbiyotda ishlatiladi.

Qotishmalari. Elektroliz usulda K₂CO₃- KCl katod plastinkasida qotishmasi olinadi.

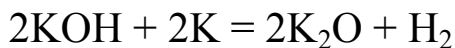
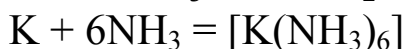
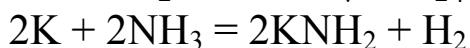
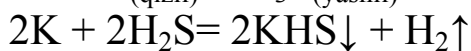
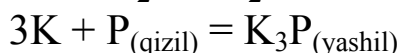
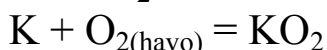
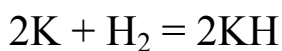
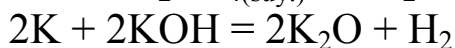
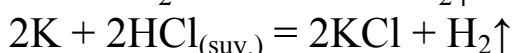
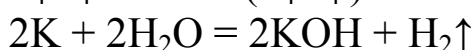
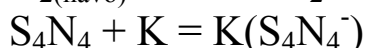
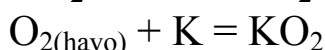
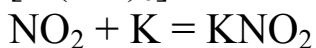
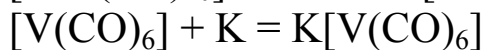
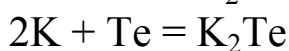
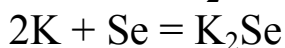
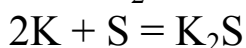
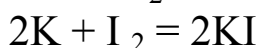
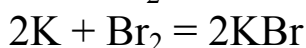
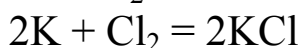
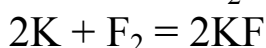
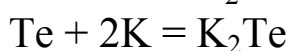
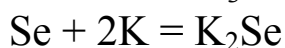
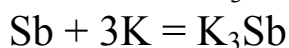
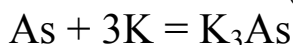
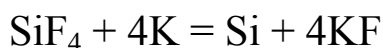
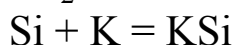
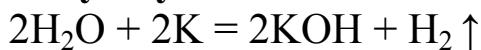
Olinishi. Kaliy olishda quyidagi usullardan foydalaniladi:

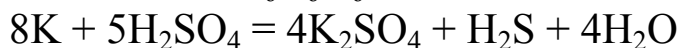
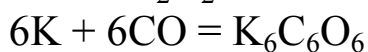
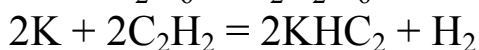
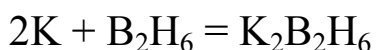
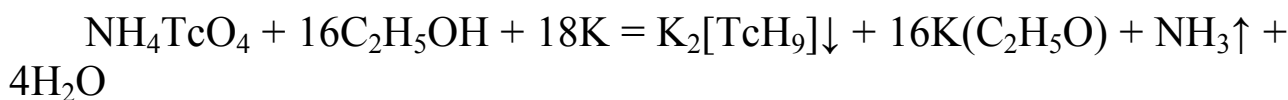
1. Suyuqlantirilgan KOH yoki KCl eritmasidan kaliy natriy bilan siqib chiqariladi;
2. KCl va NaCl tuzlari aralashmasi suyuqlantirib elektroliz qilinadi. Katodda qaytarilgan Na va K aralashmalarini haydab, kaliy ajratib olinadi;
3. KCl tuzini vakuumda Aluminiy yoki kremniy bilan qaytarib olinadi. Shuningdek, kaliy xlorid yoki kaliy gidroksidlarning suyuqlantirilgan eritmalarini elektroliz qilish usulida kaliy sof holda

ajratib olinadi. O'z navbatida kaliy xloridni havosiz vakuumli sharoitda aluminiy yoki kremniylar bilan qizdirilganda kaliy ajralib chiqadi.



kimyoviy xossalari:





Kalsiy - Ca

KALSIY: belgisi - Ca. 1808-yilda olingan, (Calcium,

lotincha “calx”- ohak soʻzidan, ilk bor soʻndirilgan ohakdan olingan); davriy sistemaning II guruh kimyoviy elementi, tartib raqami 20, atom massasi 40,08; $t_{\text{suyuq}}=851^{\circ}\text{C}$, $t_{\text{qayn}}=1484^{\circ}\text{C}$, zichligi $1,540 \text{ g/sm}^3$, ishqoriy yer metallar guruhiga mansub kimyoviy element.

Kumushrang kubik shaklli, qoʻrgʻoshindan bir oz qattiqroq, uni kesish va bolgʻalash juda oson; elektr tokini yaxshi oʻtkazadi; ikki valentli, suv bilan shiddatli ravishda reaksiyaga kirishadi, sovuqda, quruq holda faol emas, alangani qizgʻish-sariq tusga boʻyaydi. Kalsiy yer qobigʻining 3,4% ini tashkil qiladi. Yer qobigʻida tarqalishi boʻyicha elementlar oʻrtasida beshinchi oʻrinni (kislorod, kremniy, aluminiy va temirdan keyin) egallaydi.

Minerallari. Asosiy minerallari: kalsit (boʻr, marmar, ohaktosh) angidrit, gips, flyuorit (plavik shpat).

Ishlatilishi. Kalsiy sof metall koʻrinishida koʻpgina nodir va qiyin eriydigan metallar, ular birikmalarini qaytaruvchi sifatida foydalaniladi. Kalsiy poʻlat, bronza va boshqa qotishmalarning oksidsizlantiruvchisi sifatida ham ishlatiladi, antifraksion materiallar tarkibiga kiradi. Kalsiy birikmalari (ohak, sement) qurilishda keng ishlatiladi.

Qotishmalari. Elektroliz usulda qaytarilganda quyidagi metall elementlar bilan qotishmalar hosil qiladi:

U, Th, Cr, V, Zr, Cs, Rb, Ti, Be.

Olinishi. Kalsiy, stronsiy, bariy metallari birinchi boʻlib Xevi tomonidan elektroliz usuli bilan olingan. Elektroliz qilishda, ularning tuzlari yuqori haroratda suyuqlantiriladi. Katodda metallar ajralib chiqadi. Bundan tashqari kalsiy metallini vakuumda alyuminotermiya usuli bilan

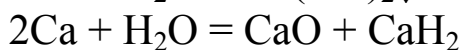
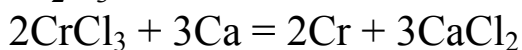
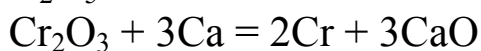
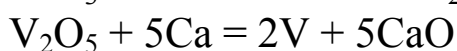
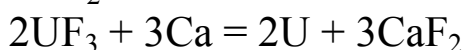
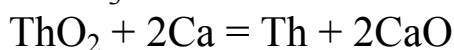
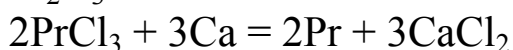
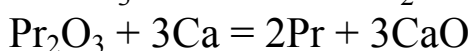
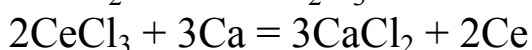
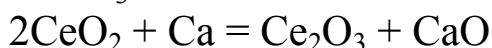
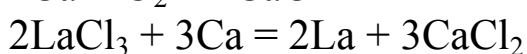
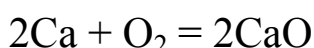
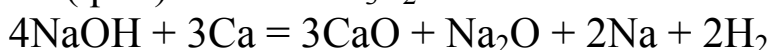
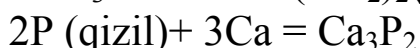
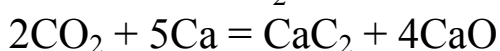
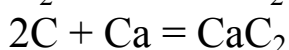
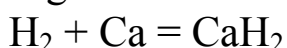
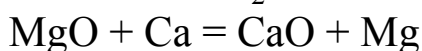
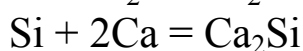
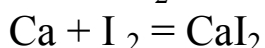
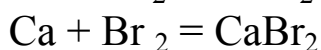
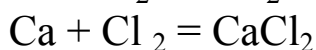
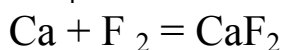
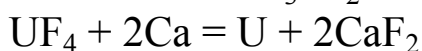
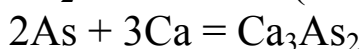
ham olish mumkin. Chili selitrasini qayta ishlash texnologiyasida kaliy erkin holda ajratiladi. Oksidlar, ohak va boshqa minerallarni qayta ishlash texnologiyasida kalsiy ajratiladi.

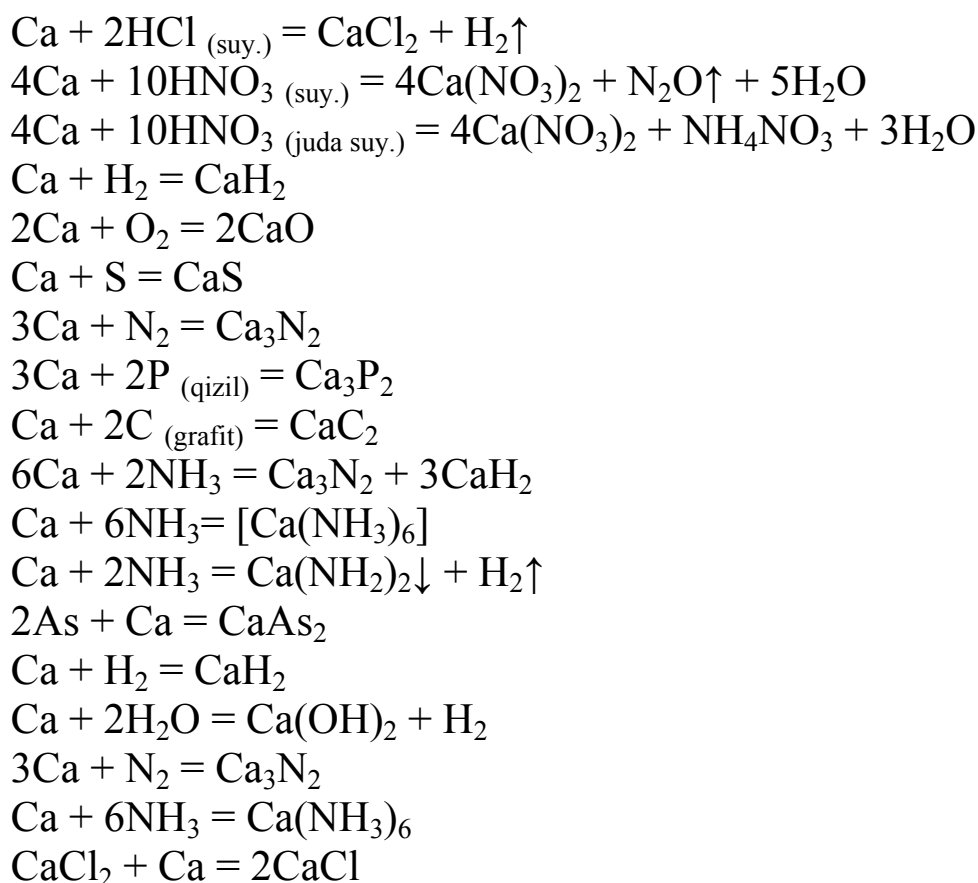
Shuningdek, sanoatda kalsiyning olinishida ikki xil usul ishlatiladi:

1) Elektroliz jarayonida CaCl_2 eritmasi misli elektrodni katod, grafitlangan anodli tartibda 62-65% kalsiy sof holda olinadi.

2) Aluminiyli termik usulda, yuqori haroratda CaO birikmasi Aluminiiy kukuniga aralashtirilib, xromnikelli asbobida va kumush holda sof kalsiy olinadi.

kimyoviy xossalari:





Skandiy - Sc

SKANDIY: belgisi - Sc (lot. Scandia, element kashf etilgan joy - Skandinaviya nomidan). D. I. Mendeleev davriy sistemani tuzganda bu element topilmagan bo'lsada, u o'zining davriy qonuniga asoslanib, 21-joyni bo'sh qoldirdi va bu elementning borligini oldindan aytdi, butun xossalarini ko'rsatib, unga ekabor deb nom berdi. Haqiqatan ko'p o'tmay (1879-yilda Skandinaviyada) bu element topildi va D. I. Mendeleevning aytganlari to'g'ri chiqdi. Skandiy davriy sistemaning III guruh kimyoviy elementi, tartib raqami 21, atom massasi 44,956, kumushsimon, geksagonal kristallik metall. Skandiy och sariq tusda tovlanib turadigan kumushsimon rangli metall; zichligi $3,02 \text{ g/cm}^3$, $t_{\text{suyuq}}=1544^\circ\text{C}$, $t_{\text{qayn}}=2836^\circ\text{C}$.

Minerallari. Yer kurrasida 10-3 % ni tashkil qiladi. Nodir yer metallarga kiradi. Tortveytrit Sc $[\text{Si}_2\text{O}_7]$, sterettit $\text{ScPO}_4 \cdot 2\text{H}_2\text{O}$. Izomorf qo'shimchalar sifatida 0,005-0,3% Sc_2O_3 . Skandiy tarkibli minerallar: oksidlar, karbonatlar, silikatlar, fosfatlar, volfromitlar. Titan xomashyosi tarkibida Sc_2O_3 ilmenitda 0,1% gacha, sfenda 0,3% gacha, volfromitlarda Sc_2O_3 0,005 - 1,0% gacha, boksit tarkibida 0,001 - 0,01% gacha mavjud.

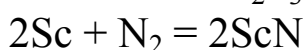
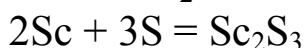
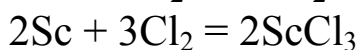
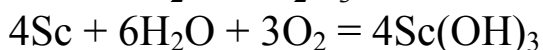
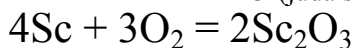
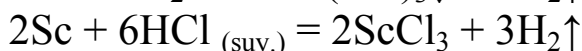
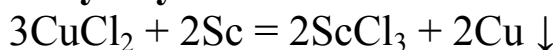
Shuningdek, ba'zi temir rudalari tarkibida (0,001 - 0,005% Sc₂O₃), qalay rudasida (0,02 - 0,22% Sc₂O₃), berill konsentratlarida (0,1 - 0,2% Sc₂O₃), ba'zi ko'mir kulida (0,01% Sc₂O₃), fosforitlarda mavjud.

Ishlatilishi. Skandiyli ferritlardan EHMning tez ishlovchi xotira elementlari tayyorlanadi. Skandiy boshqa sohalar (metallurgiya, raketa va aviasozlik) da qo'llash ustida tadqiqotlar olib borilmoqda.

Qotishmalari. Skandiy tarqoq element; u volfram, qalay, uran, temir ishlab chiqarish chiqindilarini qayta ishlab olinadi.

Olinishi. Skandiy rudalardan ajratib olish texnologik jarayonlari ko'p mehnat talab qiladi. Bunda rudani boyitish orqali mahsulotlar Sc₂O₃ yoki ScCl hosil qilish, turli kimyoviy usullar bilan qayta ishlash kiradi. Skandiy (III) oksidini natriy xlorid yoki xlorid kislotaga qo'shib (suyuqlanish haroratini pasaytirish uchun) termik elektroliz qilib, skandiy ajratib olinadi.

kimyoviy xossalari:



Titan - Ti

TITAN: belgisi - Ti. Davriy sistemaning IV guruh kimyoviy elementi, Ti (lot.Titanium), tartib raqami 22, atom massasi 47,90; Titan po'latga o'xshash kulrang yumshoq metall, texnik titan qora qattiq kukun, $t_{\text{qayn}}=3169^{\circ}\text{C}$; $t_{\text{suyuq}}=1668^{\circ}\text{C}$, zichligi 4,515 g/sm³, kislotalarda eriydi;

Yengil, qiyin eruvchi, juda mustahkam va plastik, kimyoviy jihatdan turg'un. Chet elda yiliga o'rtacha 3 mln.ga yaqin titan dioksidi ishlab chiqariladi. 1791-yilda Gregor (Angliya) tomonidan temirli titan - menakenit minerali tarkibidan kashf etildi va menaken deb ataldi.

1795-yil nemis kimyogari Klaprot rutil minerali tarkibidan yangi element kashf etib, uni titan deb nomladi. Oradan ancha yil o'tgach ma'lum bo'ldiki, menaken va titan bitta kimyoviy element ekan.

1910-yilda amerikalik kimyogar Xanter titan tetraxloridni natriy bilan qaytarib, sof titan olishga muvassar bo'ldi va xalq xo'jaligida foydalana boshlandi.

Yer qobig'ida titan konstruksion metallar ichida tarqalishiga ko'ra temir, Aluminiy va magniydan keyin to'rtinchi o'rinda bo'lsa, barcha kimyoviy elementlar orasida yer qobig'ida tarqalishi bo'yicha 9-o'rinda (massa bo'yicha 0,61%) turadi. U nafaqat yerda, ya'ni tuproqda, balki o'simliklarda, torfda, toshko'mirda, hatto hayvonlar suyagida, inson va jonivorlar qonida ham uchraydi.

Minerallari. Ilmenit - titanli temir $\text{FeO} \cdot \text{TiO}_2$. Bu titan minerallari ichida eng ko'p tarqalganidir. Dunyoda birinchi bo'lib, Rossiyaning Ural tog'larida topilgan. Yirik sochma qumli ilmenit konlari Hindiston, Avstraliya, Indoneziya, Afrika, Kanada, Braziliya, Janubiy Amerika, AQSH va MDH mamlakatlarida uchraydi. Titanning yetmishga yaqin turli minerallari o'rganilgan bo'lib, shundan sanoat miqyosida keng qo'llanilgan va titanga boy minerallari 4 tadir. Rutil – tabiiy titan dioksidi TiO_2 , ko'pincha temir oksidi bilan aralashmasi uchrab turadi, zichligi 4,18-4,28 g/sm³. Yirik konlari Avstraliya, Kanada va Braziliyada joylashgan. Perovskit – kalsiy-titanat $\text{CaO} \cdot \text{TiO}_2$ (58,7% TiO_2), zichligi 3,95-4,05 g/sm³. Rossiyaning Kolsk yarim orolida keng tarqalgan. Kelajakda eng kata konlardan va titanning asosiy xomashyo manbalaridan biri bo'lishi kutilmoqda. Sfen yoki titanit – bu titanosilikat-kalsiydir $\text{CaO} \cdot \text{TiO}_2 \cdot \text{SiO}_2$ (38,8% TiO_2), zichligi 3,4 - 3,56 g/sm³. Rossiya va MDH mamlakatlarida hamda AQSH, Kanada, Madagaskarda titan qazib olish keng qo'llanib kelinmoqda.

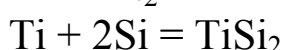
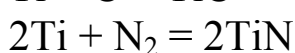
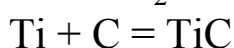
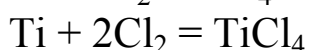
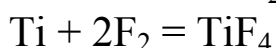
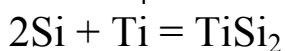
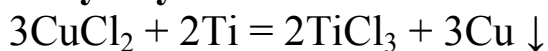
Ishlatilishi. Po'lat tayyorlashda po'latdan kislorod va azotni yo'qotish uchun titan ishlatiladi. Kimyo sanoatidagi titanli quvur o'tkazgichlar, nasoslar va reaktorlar agressiv muhitlarga turg'unligi bo'yicha boshqa metall materiallarga qaraganda ancha yuqori. Titanning gazni yutish xususiyatidan vakuum texnikasida foydalanilmoqda. Oq bo'yoq titanli belila – TiO_2 dan ishlab chiqariladi. Titan va uning qotishmalari zanglamasligi uchun ham kengroq kimyo, mashina qurilishi sanoatida, issiqlik energiya tarmoqlarida, tibbiyotning jarrohlik asboblari keng foydalaniladi. Samolyot va reaktiv dvigatellarning asosiy qismi va dvigatelning asosi aynan titanli qotishmalardan yasaladi. Titan

metall holida taxminan 75-80% li aviatsiya, kosmik va suvda suzuvchi kema texnikalarida, kimyo va boshqa tarmoqlarda ishlatiladi.

Qotishmalari - tarkibida Aluminiy, molibden, vanadiy, marganes, xrom, qalay, temir va boshqa elementlar bo'lgan titan asosidagi qotishmalar. Mustahkamligi yuqori, zichligi kichik; xona harorati hamda yuqori haroratlarda dengiz suvi va ba'zi agressiv muhitlarda zanglash va yemirilishga samolyot va raketasozlik, energetika mashinasozligi, kemasozlik, kimyo sanoati va boshqa sohalarda qo'llaniladi.

Olinishi. Titanli rudalar boyitilgach, tarkibida 45-70% gacha TiO_2 li boyitma so'ng tetroxlorid titan olinadi. Xloratorlarda olingan $TiCl_4$ qo'shimchalardan tozalanib, keyin esa kuydirish yoki sulfat kislotasi yordamida tayyor mahsulot olinadi. Shuningdek, sanoatda boyitilgan titanrudasi koks bilan (bir vaqtda xlor ta'sir ettirib) biriktiriladi. $TiCl_4$ argonmuhitida magniy bilan qaytariladi; olingan g'ovak titan – texnikaning eng muhim materialidir.

kimyoviy xossalari:



Vanadiy -V

VANADIY:belgisi - V. 1830-yilda shved kimyogari va minerologi N. Syofstryom tomonidan kashf etilgan kimyoviy element [tuzlarining rangi chiroyli bo'lgani uchun qadimgi skandinavlarining go'zallik ma'budasi "Vanadis" nomi bilan atalgan], (lot. Vanadium), tartib raqami 23, atom massasi 50,942; kub shaklidagi kulrang metall, nihoyatda qattiq, ammo mo'rtdir; zichligi $6,11 \text{ g/sm}^3$, $t_{\text{suyuq}}=1917^0\text{C}$, $t_{\text{qayn}}=3392^0\text{C}$.

Yer qobig'ida u 0,02% ni tashkil etadi. Uning alohida vanadiyli konlari uchramasada, vanadiy yer yuzida anchagina tarqalgan, ammo tog' jinslari va minerallarida tarqoq holda uchraydi. Chet ellarda yiliga o'rtacha 50-60 ming tonna (V_2O_5 hisobida) ishlab chiqariladi. 1 kg

ferrovanadiy 115 AQSH dollarida (vanadiy hisobida) narxlanadi. Roskoelit vanadiyli muskovit bo'lib, Avtraliya, AQSH va MDH mamlakatlarida, hatto Markaziy Qozog'istonda ko'p uchraydi. Uning tarkibida kaliy, Aluminiy va kremniy bor. Vanadinit MDH mamlakatlarida ham bo'lib, ko'proq qo'rg'oshin ruxli makonlarda ham uchrab turadi. Uning tarkibida qo'rg'oshin va rux bor. Vanadiyli konlar AQSH, Finlyandiya, Xitoy, Hindiston va MDH davlatlarida keng ishlab chiqariladi.

Minerallari. 50 dan ortiq minerallari mavjud bo'lib, 4 ta minerali keng tarqalgan. Ular roskoelit, patronit, vanadinit, karnotit minerallaridir.

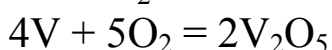
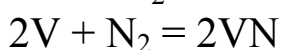
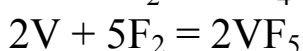
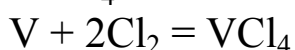
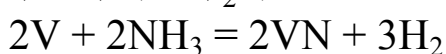
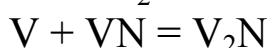
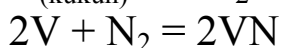
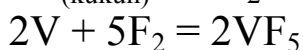
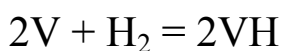
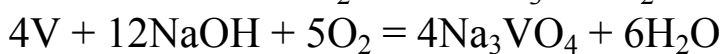
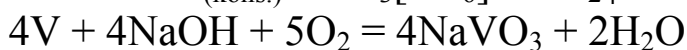
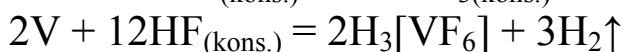
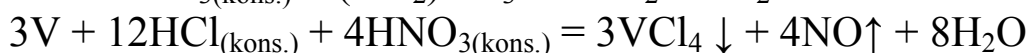
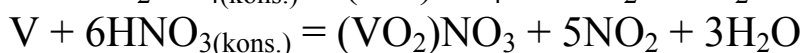
Ishlatilishi. Birikmalari zaharli; vanadiy po'latlar tayyorlashda ishlatiladi, bunday po'latlar mustahkam, elastik va zarbga chidamli bo'lgani uchun avtomobil va aviatsiya motorlari tayyorlashda muhim ahamiyatga ega. Titanomagnetitli va cho'kindi temir rudalari vanadiyning muhim manbalaridir. Vanadiyning asosiy iste'molchisi – qora metallurgiya (ishlab chiqarilayotgan metallarning 95% ga yaqiniga qo'shiladi). Vanadiy ko'pgina po'latlar tarkibiga kiradi va ularning mustahkamligi, qayishqoqligi va yeyilishga turg'unligini keskin oshiradi. Vanadiy birikmalari sulfat kislotaishlab chiqarishda katalizator sifatida, rezina, shisha, bo'yoq va boshqa sanoat sohalarida ishlatiladi.

Qotishmalari. Vanadiyning qotishmalari asosan bug'li silinder porshen halqalarini va bug' mashinalarining zalotniklarini yasashda keng qo'llaniladi. Shuningdek, aviatsiyada raketalar reaktiv dvigatellarining asosiy elementlarini yasashda, atom yadro reaktorlarini qoplashda qo'llaniladi. Vanadiy kimyo sanoatida yaxshi katalizator, fotografiya va kinomatografiyada plyonkalarni qayta yuvish vositasi sifatida ham ishlatiladi.

Olinishi. Vanadiy pirometallurgiya usuli bilan fosforit cho'yanlari olish paytidagi chiqqan toshqol tarkibidan ajratib olinadi. Toza vanadiy olish uchun esa vanadiy iodidini termik parchalash kerak. Toza vanadiy olishda avval besh, uch oksidli vanadiy olinadi. Besh oksidli vanadiy tozalangan disterlangan kalsiy bilan qaytarib olinadi. 99, 95 % li vanadiy yodidlarni termik dissotsiatsiya qilish natijasida olinadi. Uch oksidli vanadiy vakuumda uglerod bilan qaytarish usuli, ya'ni vakuumda ugletermik qaytarish usuli bilan olish mumkin. Bundan tashqari inert gaz atmosferasida uch oksidli vanadiy suyuq magniy bilan qaytarish usuli bilan olinadi. Vanadiy, asosan, temirni vanadiy rudalaridan sulfat kislotasi yordamida tanlab eritiladi va olingan eritma neytrallanib, gidroksid vanadiy olinadi. U eritilib, V_2O_5 hosil bo'ladi va amomotermiya

yordamida ferrovanadiy olinadi. U asosan tayyor mahsulot bo‘lib, sanoatda keng qo‘llaniladi. Vanadiy toza metall holida elektroliz usuli bilan juda kam miqyosda ajratib olinadi. Chunki bugungi kunda vanadiy qotishmasi ko‘proq qora metallurgiya sanoatida kerakli xomashyolardan biridir.

Kimyoviy xossalari:



Xrom -Cr

XROM:belgisi - Cr. (Chromium, yunoncha “chroma” rang, bo‘yoq so‘zidan olingan), (lot. Chromium), davriy sistemaning VI guruh kimyoviy elementi, tartib raqami 24, atom massasi 51,996; zichligi 7,190 g/sm³, t_{suyuq}=1890⁰C, t_{qayn}=2200⁰C havoda oksidlanmaydi, oq-kulrang qattiq metall. Kislotalarda, ishqorlarda eriydi, suvda erimaydi. Xrom asosan, metallurgiyada ishlatiladi; u zanglamaydigan, issiqbardosh, kislotabardosh po‘lat tarkibiga kiradi. Tarkibida xrom bo‘lgan qotishmalardan korroziyaga uchraydigan detallar (suv osti kemasi korpusining detallari, kimyoviy apparaturalar) tayyorlanadi. Boshqa metallarni korroziyadan saqlash maqsadida ularning sirtiga xrom qoplanadi (xromlanadi).

Xromlash. 1) Metall buyumlarni korroziyadan saqlash, mexanik yeyilishga qarshiligini oshirish va bezash maqsadida ularning sirtiga elektrolitik usulda xrom yugurtirish.

2) Po‘lat buyumlarga olovbardoshlik, issiqbardoshlik, toliqishga qarshilik, yeyilishga chidamlilik, kislota va dengiz suvlariga korroziyabardoshlikni oshirish, kerakli magnit va elektr xarakteristikalarini berish uchun ularning sirtqi qatlamlarini xrom bilan diffuziyali to‘yintirish.

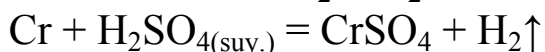
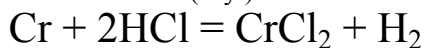
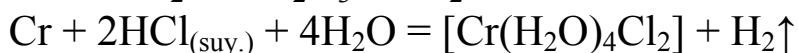
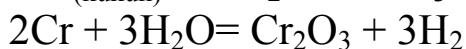
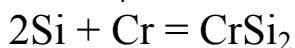
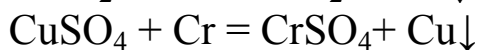
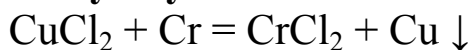
Minerallari. Xrom minerallaridan xromit (xromli temirtosh) katta amaliy ahamiyatga ega.

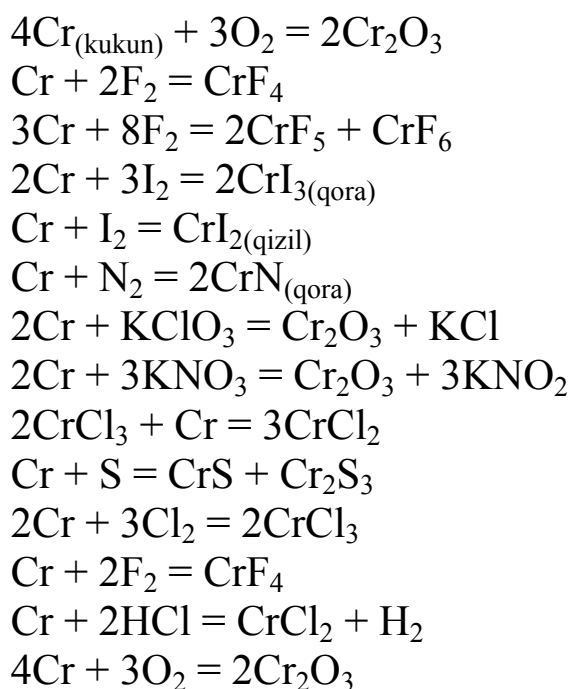
Ishlatilishi. Xromli po‘latlar tayyorlashda va metallarni korroziyadan saqlash uchun metall sirtini qoplashda ishlatiladi; Xrom birikmalari bo‘yagichlar, oksidlovchi modda, teri oshlovchi modda sifatida ishlatildi.

Qotishmalari – siyrak yer elementlari, nikel, titan, vanadiy va boshqa elementlar qo‘shilgan xrom asosidagi issiqbardosh qotishmalar 1100-1200⁰C haroratdagi mustahkamlik xossasi bo‘yicha temir va nikel asosidagi qotishmalar bilan ancha qiyin eriydigan metallar (niobiy, molibden, volfram) asosidagi qotishmalar o‘rtasida turadi. Suyuq va gzsimon agressiv muhitlarda ishlashi mumkin. Xrom qotishmasining asosiy kamchiligi– zarbiy qovushqoqligining pastligi va 150-200⁰C dan past haroratda kesilishga sezgirligidir. Shuningdek, xrom qotishmalariga xrom-nikel, xrom-nikel-volfram, xrom-nikel-kobalt-titan karbidi sistemasidagi ko‘p xromli (35-45% xrom bo‘lgan) issiqbardosh qotishmalar ham kiradi.

Olinishi. Xrom minerallarini qayta ishlash texnologiyasida xrom erkin holda ajratib olinadi. Toza xrom olish uchun avval xrom (III)- oksidi olinadi. Xrom toza bo‘lishi xrolit soda bilan havo ishtirokida qattiq qizdirilib, koks bilan qaytariladi va sof holda xrom olinadi.

Kimyoviy xossalari:





Marganes - Mn

MARGANES:belgisi - Mn. 1774 yilda shvedolimi Sheyelle tomonidan temir qotishmasi tarkibidan topilgan, song uning vatandoshi Yu.Gan tomonidan sof holda ajratib, metall hilida olingan.Davriy sistemaning VII guruh kimyoviy elementi (lot. Margan ium), tartibraqami 25, atom massasi 54,93, oq, qattiq va mo‘rt kumushsimon kubik kristallik modda, kislotalarda eriydi, zichligi $7,440 \text{ g/sm}^3$, $t_{\text{suyuq}}=1244^{\circ}\text{C}$; $t_{\text{qayn}}=2070^{\circ}\text{C}$. Oksidlari elektr pechlarida kremniy bilan qaytarib, MnSO_4 eritmalarini elektroliz qilib va boshqa usullar bilan olinadi.

Minerallari. Tabiatda marganes minerallar tarkibida uchraydi; alabandin - MnS , gauerit - MnS_2 , manganozit - MnO , gausmanit - Mn_3O_4 va boshqalar. Marganes minerallaridan eng ko‘p tarqalgani pirollyuzit vaisilomelan.

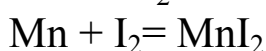
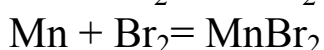
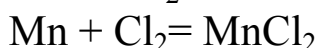
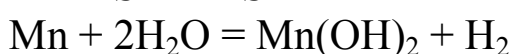
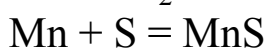
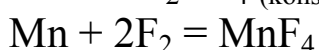
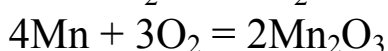
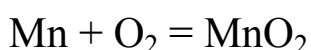
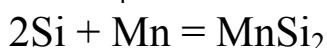
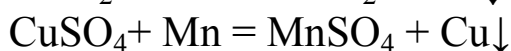
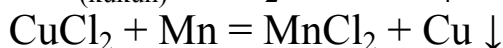
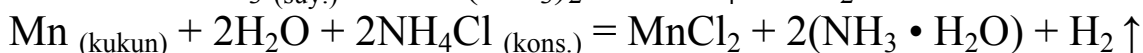
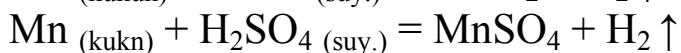
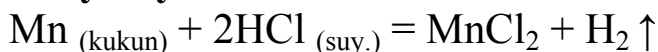
Ishlatilishi. Marganes, asosan (90%), metallurgiyada po‘latni oksidsizlash,oltingugurtdan tozalash va legirlashda ishlatiladi (po‘latga qovushqoqlik va qattiqlik beradi). Marganesning karbonil birikmalari, masalan, $\text{C}_6\text{H}_5\text{Mn}(\text{CO})_3$ motor yonilg‘isining antidetanatori sifatida ishlatiladi.U texnikada katta ahamiyatga ega; metallurgiyada ishlatiladi; qotishmalarni qattiq va mustahkam qiladi.

Qotishmalari. Marganes sanoatda po‘lat va cho‘yanlar tarkibida Bo‘lib qotishma hosil qiladi.

Olinishi. Marganesli rudalari tabiatda ancha boy bo‘lib, agar metall tarkibida marganes kam bo‘lsa boyitiladi. Qolgan hollarda rudalar koks

aralashmasi bilan elektr pechlarida (goho domna pechlarida) eritilib, ferromarganes va boshqalar olinadi. Suyuq holdagi yuqori haroratdagi toshqol boshqa elektr pechda qayta ishlanib, uglerodsiz va temirsiz silikomarganes (Si va Mn) olinadi. U o'z navbatida boshqa elektrpechda, marganesli ruda yordamida eritiladi va uglerodsiz oliy navli, boshqa ferromarganesga qaraganda ancha sifatli va qimmat bo'lgan ferromarganes olinadi. Shuningdek, marganes elektr pechlarida alyumotermik va silikotermik usullar bilan olinadi. Bunday usul bilan olingan marganes uncha toza bo'lmaydi, lekin bunday aralashmalar sanoatda o'tga va issiqlikka chidamli materiallar olishda asosiy xomashyo hisoblanadi. Toza holdagi marganes uning ikki valentli tuzlaridan elektroliz qilib olinadi.

kimyoviy xossalari:



Temir - Fe

TEMIR: belgisi - Fe. (ferrum - lotincha qo'rg'on) davriy sistemaning VIII guruh kimyoviy elementi, tartib raqami 26, atom massasi 55,847. Toza temir olish uchun uning oksidini vodorod bilan qaytarib yoki temir tuzlarini elektroliz qilish orqali olinishi mumkin. Kumushday oq yaltiroq, hajmi markazlashgan kubik kristallik yumshoq metall. Temir insonga

qadimdan ma'lum bo'gan eng eski va eng ko'p olinadigan metall. Kristallik tuzilishi yoki magnit xossasi bo'yicha farq qiladigan allotropik modifikatsiyaga ega. Odatdagi haroratda (769°C gacha) hajmi markazlashgan kub panjarali (OTSK) $\alpha = \text{Fe}$ ferromagnit turg'un; zichligi $7,874 \text{ g/m}^3$, $t_{\text{qayn}}=2750^{\circ}\text{C}$; $t_{\text{suyuq}}=1539^{\circ}\text{C}$.

Temir plastik, yaxshi bolg'alanadi, prokatlanadi, shtamplanadi va sim bo'lib cho'ziladi. Temirning uglerod va boshqa elementlarni eritish xususiyati turli temir qotishmalari olishga asos bo'ladi, bu 960°C ga qadar barqaror temir α -temir deb ataladi, u ferromagnitlidir. Ammo 769°C da ferromagnitligi yo'qoladi va paramagnit bo'ladi, shuning uchun $762\text{-}910^{\circ}\text{C}$ da bu α – temir ko'pincha β - temir deyiladi. Demak, α va β -temirlarning kristall shakllari bir xil, faqat α - shakl ferromagnitli, β - shakl paramagnitli, 910°C da temir qirra markazli kubik shaklga o'tadi; paramagnitli 906°C dan yuqorida barqaror temir γ - temir deyiladi, bu uglerodni o'zida erita oladi va shuxususiyati bilan α - β - temirlardan farqlanadi, d 8,0 - 8,1, γ - temir 1401°C da β -temirga o'tadi. Buning kristall shakli α - temirning shakliga o'xshaydi, d 7,3. Shunday qilib, temirning ikki xil kristall shakllari bor ($\alpha - \gamma -$ temir dinamomashina va elektromagnitlarda ishlatiladi, tez magnitlanish va magnitsizlanish xossasi bor). Quruq havoda o'zgarmaydi, ammo nam havoda zanglab ketadi. 769°C (Kyuri nuqtasi) da temir paramagnitga aylanadi, panjarasi o'shandayligicha qoladi. 911°C bilan 1400°C orasida qirralari markazlashgan kub panjarali (GTSK) $\gamma - \text{Fe}$ turg'un, 1400°C dan yuqorida yana OTSK- panjara hosil bo'ladi. Uglerodning $\alpha = \text{Fe}$ dagi qattiqeritmasi *ferrit*, $\gamma = \text{Fe}$ dagi eritmasi esa *austenit* deyiladi. Yuqori legirlangan po'latlar (tarkibida ko'p miqdorda nikel, xrom, volfram va boshqa bo'lgan) elektr yoy va induksion pechlarda eritib olinadi. Temir hozirgi zamon texnikasida (mustahkamligi past bo'lganligidan sof holda amalda foydalanilmasa ham) muhim metall hisoblanadi. Barcha metall mahsulotlarning taxminan 95% temir qotishmalariga to'g'ri keladi. Temir asosida yuqori va past haroratlar vakuum va yuqori bosimlar, agressiv muhitlar, yuqori o'zgaruvchan kuchlanishlar, nurlashishlar va boshqa ta'sirlarga chidaydigan yangi materiallar yaratilmoqda.

Minerallari. Uning muhim minerallari – magnetit, titanomagnetit, gematit va boshqa temir rudalari konlarini tashkil etadi.

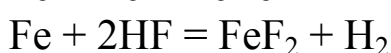
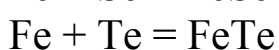
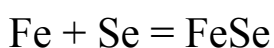
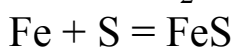
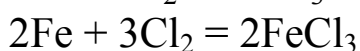
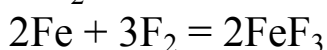
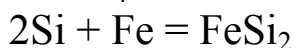
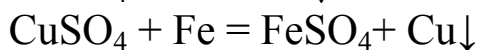
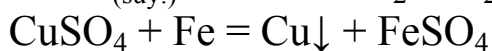
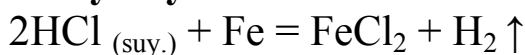
Ishlatilishi. Temirdan cho'yan, po'lat, tunuka tayyorlanadi. Maxsus yo'llar bilan tayyorlangan toza temir zanglamasligi va kislotalar ta'siriga bardosh berishi yaqinda ma'lum bo'lgan. Temir suyultirilgan kislotalardan vodorodni haydaydi. Konsentrlangan HNO_3 temirni passivlashtiradi,

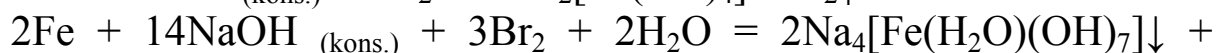
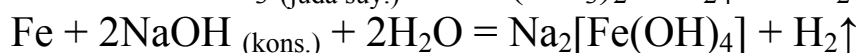
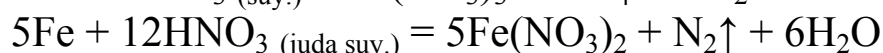
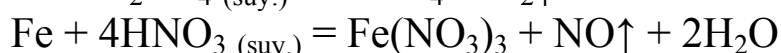
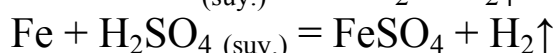
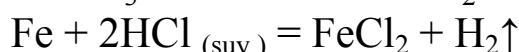
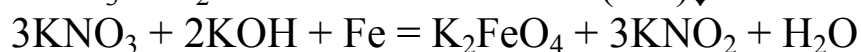
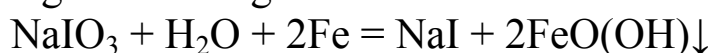
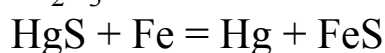
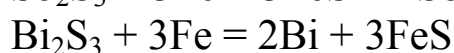
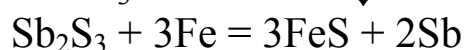
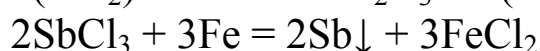
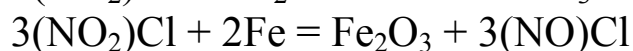
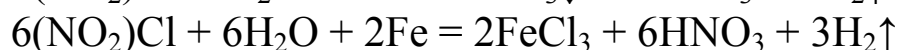
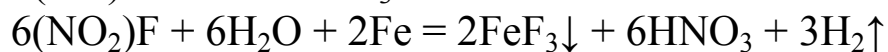
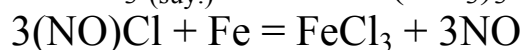
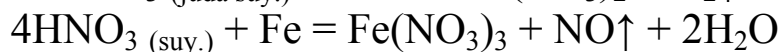
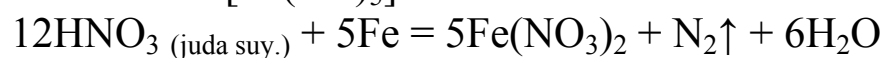
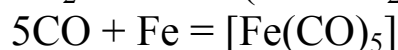
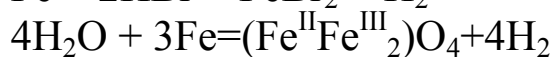
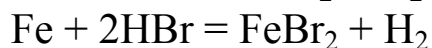
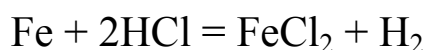
ishqorlar temirga ta'sir etmaydi. Tabiatda temir keng tarqalgan, metallar orasida Aluminiydan keyin ikkinchi o'rinda turadi. Temir rudalardan uglerodning turli qotishmalari cho'yan (domna jarayoni bilan) va po'latlar (marten, konverter, elektr yordamida eritish jarayonlari bilan) ko'rinishida olinadi.

Qotishmalari. Temir asosida uglerodli qotishmalar olinadi. Asosiy qotishmasi po'lat va cho'yandir.

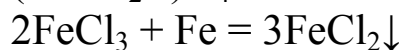
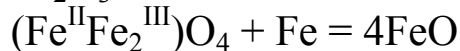
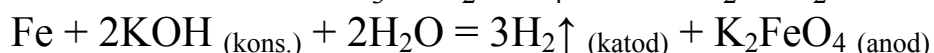
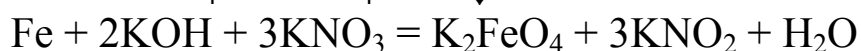
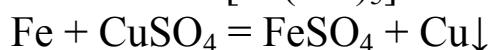
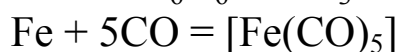
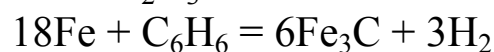
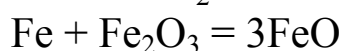
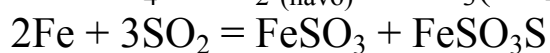
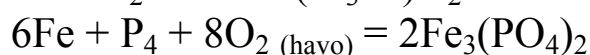
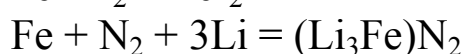
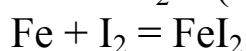
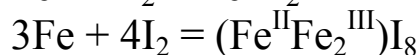
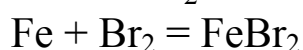
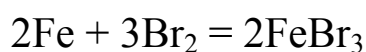
Olinishi. Temir asosan temirga boy rudalarda (tarkibida Fe-50-55%) to'g'ridan-to'g'ri maydalanib (goho aglomerat hoida) ohakli flyus va koks yordamida domna pechlarda eritilib, temir qotishmasi, ya'ni cho'yan olinadi. XX asr oxirlariga kelib domna pechlarida kislorodga boyitilgan havo yordamida, gohida qizdirilib, suv bug'iaralashmasini pechga purkash keng qo'llanilmoqda. Uning asosiy maqsadi suv bug'i tarkibidagi vodorod oz bo'lsada, koksni tejab qaytarilish xususiyatini oshiradi. Olingan cho'yan qotishmasi marten pechida oksidlovchi rafinirlash orqali undagi uglerod, oltingugurt va fosforlardan tozalanadi. Ayrim korxonalarda bu usul konvertorlash yo'li bilan ham amalga oshiriladi. So'ng eritma tarkibida qolib ketgan kisloroddan tozalash usuli ferro qotishma yoki ferrosilididlar (kremniyli moddalar) yordamida amalga oshiriladi. O'ziga kislorodni biriktirib olgan kremniyli modda toshqolga chiqib ketadi, qolgan ostki qismiga toza po'lat (temir) quyiladi. Hozirgi kunda temirli rudalar qattiq holda, eritmaga o'tkazmay past haroratda (700-1000⁰C) tabiiy gaz yordamida qaytarilib, so'ng ajratiladi va toza metall olinadi. Temirning 2 ta qotishmasi xalq xo'jaligida keng qo'llaniladi. Metall tarkibida 3% dan ortiq uglerod bo'lsa u cho'yan, aksincha, kam bo'lsa po'lat deb ataladi.

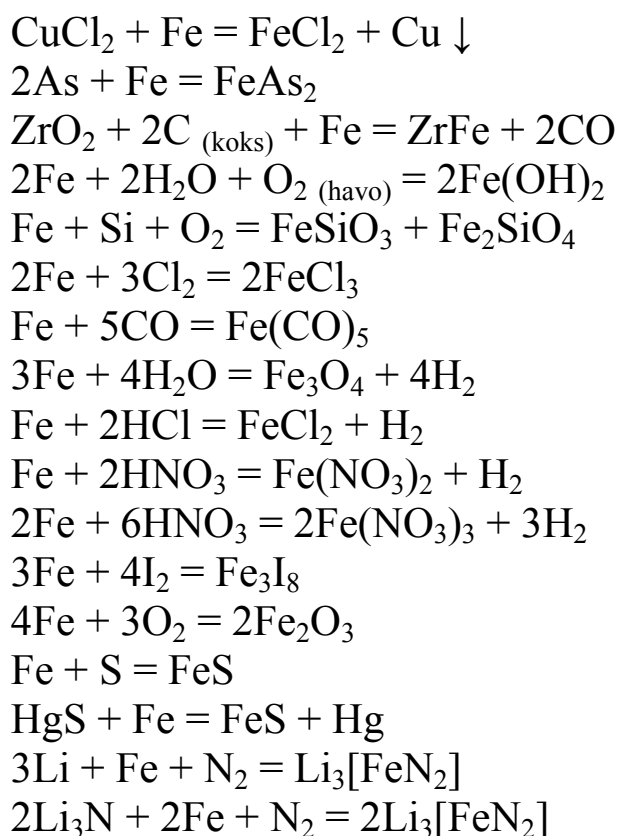
Kimyoviy xossalari:





6NaBr





KOBALT - Co

KOBALT: belgisi - Co. Kobalt nemischa jin demakdir (oʻrta asr metallurklarining fikricha, kobalt metallarni rudadan eritib olishga halaqit bergan afsonaviy narsa boʻlgan), (Cobaltun jin soʻzidan olingan), davriy sistemaning VIII guruh kimyoviy elementi, tartib raqami 27, atom massasi 58,9332, kobalt qizgʻish tusda tovlanadigan kumushsimon-oq ogʻir metall, zichligi $8,900 \text{ g/sm}^3$, $t_{\text{suyuq}}=1494^{\circ}\text{C}$, $t_{\text{qayn}}=2957^{\circ}\text{C}$, uning ikki allotrop shakli bor; α -Co geksagonal, bu 417°C gaqadar qarorli; bundan yuqori haroratda kubik panjarali; β -Co barqarordir, suyultirilgan H_2SO_4 , HCl , HNO_3 larda eriydi, suvda erimaydi, koʻpgina qotishmalar tarkibiga kiradi. Ferromagnit xossali, past haroratdan 1120°C (yuqori nuqtasi) gacha ferromagnetizm xossasini saqlaydi.

Minerallari. Kobalt minerallari (kobaltin, skutterudit) kam uchraydi. Nikel rudalari sanoatda kobalt olinadigan asosiy manbadir.

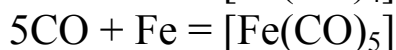
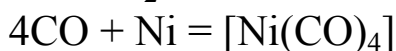
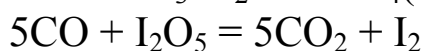
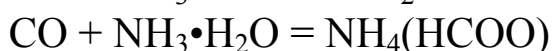
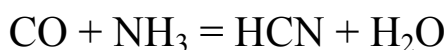
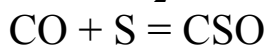
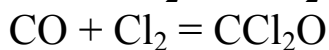
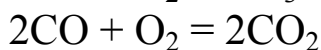
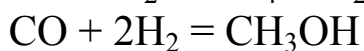
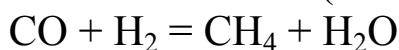
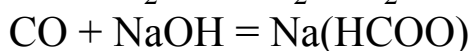
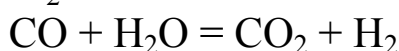
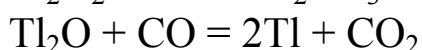
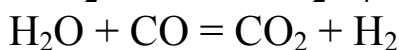
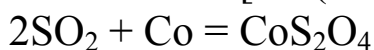
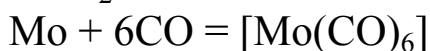
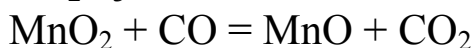
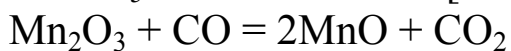
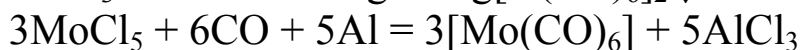
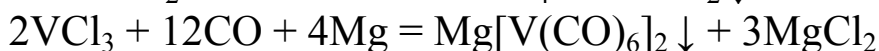
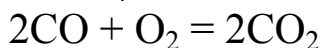
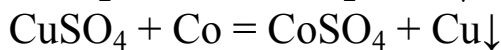
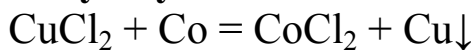
Ishlatilishi. Kobalt zangori shisha va boʻyoqlar tayyorlashda ishlatiladi. ^{60}Co radioaktiv izotopi texnika va tibbiyotda γ -nurlanish manbai sifatida ishlatiladi.

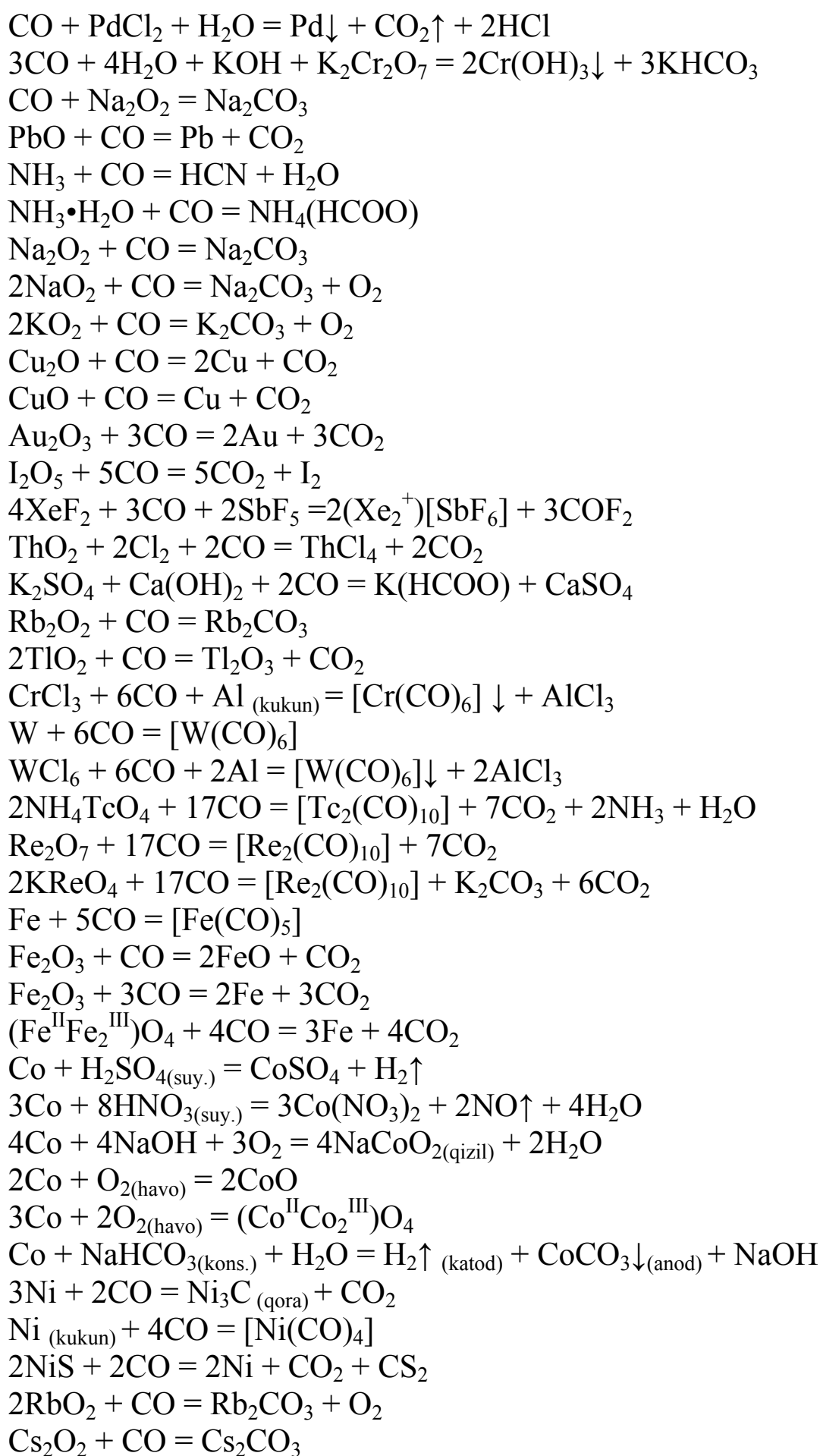
Qotishmalari - tarkibida xrom, nikel va uglerod, molibden, volfram, niobiy, kremniy, marganes va boshqa elementlar boʻlgan kobalt asosidagi

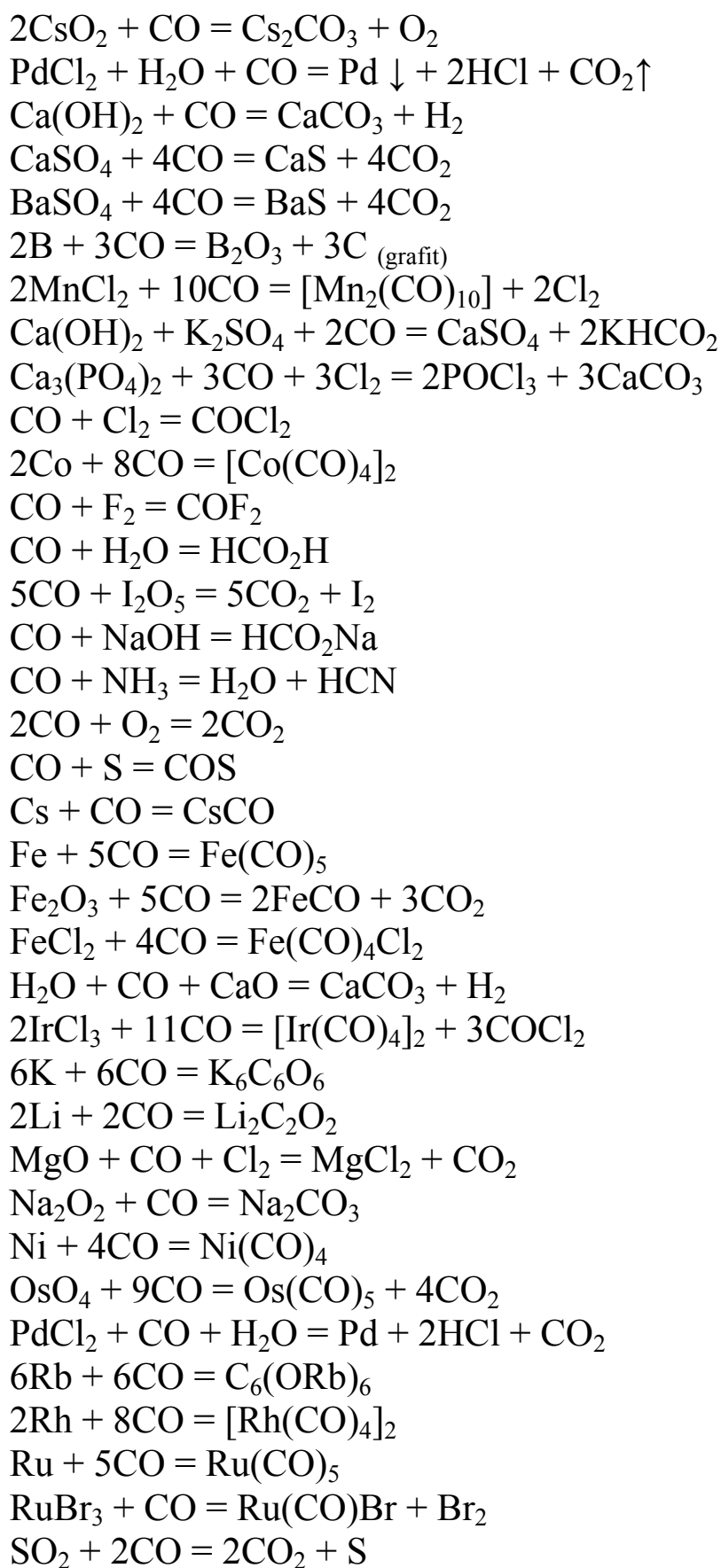
qotishmalar bor. Olovbardosh, yeyilishga chidamli va magnit jihatdan qattiq xillari bor. Kobalt kamyob bo'lgani uchun kobalt qotishmalarini ishlatish cheklangan. Kobalt tez kesar, olovbardosh, magnitli qotishmalar tarkibiga kiradi.

Olinishi. Yer qobig'ida kobalt, asosan, nikelli rudalarda uchraydi. Nikel tabiatda sulfidli va oksid holida bo'lib, sanoatda 2 xil jarayon qo'llaniladi. Sulfidli nikellarni qayta ishlash paytida kobalt, nikel-kobalt qotishmasidan, oksidli nikellarni qayta ishlash texnologiyasida esa eritma tarkibidan ajratib olinadi. Eritmadan ikkilamchi qo'shimchalar tozalanadi, kobalt gidrooksidi cho'ktiriladi, so'ng u qayta tozalanib, kuydiriladi va elektr pechida eritilib kobalt olinadi.

kimyoviy xossalari:







Nikel - Ni

NIKEL: belgisi - Ni. Mustaqil kimyoviy element sifatida nikel 1751-yilda shved kimyogari va minerologi A.Kronstedt tomonidan kashf etildi (Niccolum nemischa “kupfernikel” - yaramas mis soʻzidan olingan) davriy sistemaning VIII guruh kimyoviy elementi, tartib raqami 28, atom massasi 58,70; $t_{\text{suyuq}}=1455^{\circ}\text{C}$, $t_{\text{qayn}}=2730-2915^{\circ}\text{C}$, zichligi $8,90 \text{ g/sm}^3$, kumushday oq, nihoyatda qattiq, kub kristallik metall, qattiqligi 3,8; suvda erimaydi, suyultirilgan kislotalarda eriydi, oson yassilanuvchi metall. Havoda oʻzgarmaydi; ferromagnit. Tabiatda sulfidli mis-nikelli rudalar (petlandit minerali) va boshqa holda uchraydi.

Nikellash metall buyumlar sirtiga undan 1 mkm dan 20–30 dan ortiq mkm gacha qalinlikda nikel yugurtirishdir. Nikellash asosan elektr usulida amalga oshiriladi.

Minerallari. Tabiatda nikelning quyidagi minerallari uchraydi:

melanit - NiTe_2 ,

linarit - Ni_2As ,

mauxerit - Ni_3As_2 ,

xizlevudit - Ni_2S_2 va boshqalar.

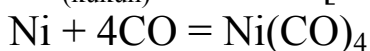
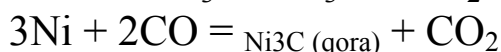
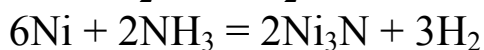
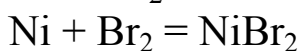
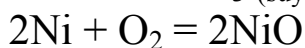
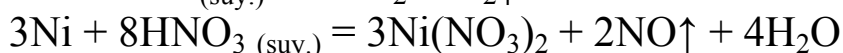
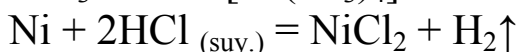
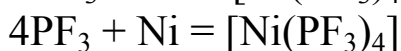
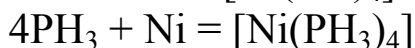
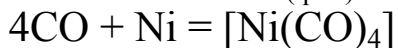
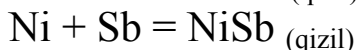
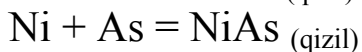
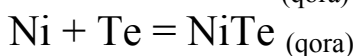
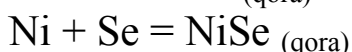
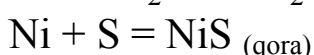
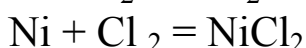
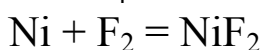
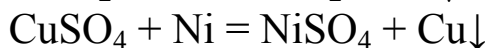
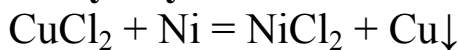
Ishlatilishi. Nikel asosan mexanik, antiqoʻrgʻoshin, magnit yoki elektr, issiqbardosh va olovbardosh (xrom-nikelli qotishmalar) xossalari ega boʻlgan qotishmalar (temir, xrom, mis va boshqa metallar qoʻshib) olishda ishlatiladi. Nikel ishqorli akkumulyatorlar, antikorrozion qoplamalar (nikellash) ishlab chiqarishda, kimyoviy apparatura tayyorlashda va koʻplab kimyoviy jarayonlarning katalizatori sifatida ishlatiladi. Buyumlarni zanglashdan saqlash va bezash, yaʼni ular sirtiga yarqiroq-kumushsimon rang berish maqsadida qoʻllaniladi. Poʻlat tayyorlashda ham ishlatiladi.

Qotishmalari - nikel (asos) ning xrom, temir, mis, marganes, molibden, kobalt va boshqa elementlar bilan qotishmasi. Issiqbardosh, korroziyabardosh, magnit jihatidan yumshoq va elektr qarshiligi yuqori boʻlgan nikel qotishmalari koʻp ishlatiladi.

Olinishi. Nikel texnologiyasi sanoatda nikel mis sulfidi bilan birga uchrasa, flotatsiya usulida boyitilib, mis va nikel konsentratlari alohida ajratib olinadi, soʻng nikelli boyitma eritilib, faynshteyn olinadi. Flotatsiya usuli bilan misdan ajratilib, qayta boyitilgach, avvaliga u kuydiriladi, soʻng qaytaruvchi yordamida yuqori haroratda qaytarilib, xomaki anodli nikel olinadi. Elektrolitik usul bilan vannada rafinirlanib, toza katodli nikel olinadi. Agar rudalar oksid holda boʻlsa, unda aglomeratlar holiga qayta

ishlanib sulfidlovchi, qaytaruvchi eritish yordamida shteyn olinib konvertorlanadi. Olingan nikelli faynshteyn oksidlovchi kuydirish yordamida nikel oksidi olinib, u qaytaruvchi eritish yordamida toza nikel olinadi.

Kimyoviy xossalari:



Mis - Cu

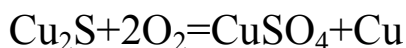
MIS: belgisi - Cu (“Cuprum” lotincha Kipr orolining ismidan olingan), davriy sistemaning I guruh kimyoviy elementi, Cu (lot. Cuprum), tartib raqami 29, atom massasi 63,546, zichligi 8,920 g/sm³, t_{suyuq}= 1083⁰C; t_{qayn}=2573⁰C; qizil rangli kubik kristallik metall, issiqlik va elektr o‘tkazuvchanligi katta; havoda oksidlanib qorayadi, nam havoda gidroksikarbonat hosil bo‘lgani uchun ko‘karadi; kislotalarda va ammiakda erib, tuzlar hosil qiladi. Misdan kimyoviy apparaturalar (issiqlik almashgichlar, muzlatkichlar, plazmatron detallari va boshqalar)

tayyorlanadi. 30% dan ortiq mis sanoatda mis qotishmalari sifatida ishlatiladi.

Minerallari. Asosiy minerallari xalkozin – Cu_2S , xalkopirit – CuFeS_2 , kuprit – Cu_2O va malaxit – $\text{Cu}_2[\text{CO}_3]_2[\text{OH}]_2$ lardir. Tabiatda sof metall holida va oltingugurt (sulfidlar) hamda kislorod bilan birikma holida uchraydi. 250 dan ortiq minerallari mavjud.

Xalkozin - Cu_2S . Mineralning nomi grekcha “xalkos” – mis soʻzidan olingan. Uning sinonimi: mis yaltirogʻi. Xalkozinning kimyoviy tarkibida Cu 79,9 %, S 20,1 %. Koʻpincha kumushda baʼzan Fe, Co, Ni, As, Au aralashmalari boʻladi. Xalkozinning rangi qoʻrgʻoshindek kulrangdir. Uning chizigʻitoʻq kulrang. U metall kabi yaltiraydi. Qattiqligi 2-3. Xalkozin qisman egiluvchandir. Ulanish tekisligi {110} boʻyicha mukammal emas. Solishtirma ogʻirligi 5,5-5,8. U elektrni yaxshi oʻtkazadi.

Diagnostik belgilari. Xalkozin qoʻrgʻoshindek kulrangliligi, kichik qattiqligi, egiluvchanligi bilan xarakterlidir (pichoq uchi bilan chizganda yaltiroq chiziq qoladi, bu bilan oʻziga juda oʻxshab ketadigan aynama rudalardan farq qiladi). HNO_3 dagi eritmasi yashil rangga kiradi. Xalkozinning mis minerallari koʻpincha bornit bilan bir assotsiatsiyada topilishi ham xarakterlidir. U dahandam alangasida eriydi, alangani havorang tusga kiritadi. Koʻmir ustida soda bilan qizdirib, sof mis sharchasi olinadi. Xalkozin kislotalarda, ayniqsa, HNO_3 da oson eriydi va oltingugurt ajralib chiqadi. Misli eritmalardan tarkibida organik qoldiqlari boʻlgan jinslar orasida organik qoldiqning asosan yogʻochlarning hamma tuzilish detallarini saqlagani holda psevdomorfoz shaklida hosil boʻlgan xalkozin ham maʼlum. Xalkozin kislorodli nurash zonasida turgʻun emas, parchalanibkuprit (Cu_2O) malaxit, azurit kabi misning boshqa kislorodli birikmalariga aylanadi. Toʻliq oksidlanish sodir boʻlmagan hollarda quyidagi reaksiya boʻyicha xalkozin hisobiga sof tugʻma mis paydo boʻladi:



Amaliy ahamiyati. Xalkozin misga eng boy sulfid boʻlib, mis sanoati uchun xalkozin rudasi sulfid konlarining har qanday rudalaridan koʻra koʻproq ahamiyatga ega. Hozirgi vaqtda butun dunyoda qazib olinayotgan misning koʻp qismi mana shu xalkozin rudalariga toʻgʻri keladi.

Xalkopirit – CuFeS_2 . Grekcha “xalkos” – mis, “piros” – oʻt (olov) demakdir. Sinonimi: mis kolchedani. Kimyoviy tarkibi: Cu 34,57%, Fe 30,54%, S 34,9%. Xalkopiritni kimyoviy analiz qilganda ham shunga yaqin natijalar olinadi. Baʼzan juda oz miqdorda Ag, Au va boshqalar

aralashmasi bo‘ladi. **Xalkopiritning rangi** jez – sariq, to‘q sariq yoki olabula bo‘lib tovlanadi. Chizig‘iyashilroq-qora. U shaffof emas. Metall kabi kuchli yaltiraydi. Qattiqligi 3-4. Xalkopirit ancha mo‘rt. Ulanish tekisligi {101} bo‘yicha mukammal emas. Solishtirma og‘irligi 4,1-4,3. Mis asosan Olmaliq shahridagi Qolmoqir konida xalkopirit va xalkozin minerallari tarkibida uchraydi.

Diagnostik belgilari. Piritdan butunlay boshqacha rangi, qattiqligi kabi o‘ziga xos belgilariga qarab oson aniqlanadi. Piritning singan joylari ham xalkopirit rangiga o‘xshab tovlanadi. Xalkopirit dahandam alangasida charsillab, yorilib-yorilib ketadi va erib magnit tortadigan sharchaga aylanadi. Soda bilan qo‘shib ko‘mir ustida qizdirilganda undan sof mis sharchasi ajraladi. Yopiq naychada oltingugurt uchib chiqadi. HNO₃ da asta-sekin parchalanib oltingugurt ajraladi.

Bornit – Cu₅FeS₄. Sinonimi: ola mis rudasi. U tabiiy sharoitlarda xalkopirit bilan cheklangan qattiq eritma hosil qiladi. Bu harorat pasayishi bilan parchalanib ketadi. Bornitning kimyoviy tarkibi turg‘un emas. Cu₅FeS₄ kimyoviy formulasiga muvofiq nazariy jihatdan u quyidagicha bo‘lishi kerak: Cu - 63,3%, Fe -11,2%, S - 25,5 %. Lekin bu shu mineral tarkibida xalkopirit bilan xalkozinni qattiq eritma holida saqlab turish kabi qobiliyatga ega bo‘lgani uchun ancha o‘zgaruvchandir. Bornitning rangi yangi singan joylarida to‘q mis-qizil, ola-bula (ko‘pincha zangor) bo‘lib tovlanib turadi. Uning chizig‘ikulrang-qora. U shaffof emas. U yarim metall kabi yaltiraydi. Qattiqligi 3. Bornit ancha mo‘rt. Ulanish tekisligi amalda ko‘rinmaydi. Solishtirma og‘irligi 4,9-5,0. Bornit elektr o‘tkazish xususiyatiga ega.

Diagnostik belgilari. Bornit rangiga, ola-bula zangor bo‘lib tovlanishiga va kichik qattiqligiga qarab oson aniqlanadi. Ochiq zangor tovlanishiga qarab uni kovellin deb o‘ylash mumkin.

Bornit dahandam alangasida erib, magnit tortadigan sharcha hosil qiladi; ko‘mir ustida soda bilan qo‘shib qizdirilganda undan sof mis sharchasi ajraladi. U HNO₃ da parchalanadi va olningugurt ajralib kislota yuziga chiqadi.

Kubanit – CuFe₂S₃. Rombik singoniyada kristallanadi. Kimyoviy tarkibi: Cu 22-24%, Fe 40-42 %, S -34-35%. Uning rangi bronza sariq bo‘lib, pirotinning rangiga juda ham o‘xshab ketadi. U metal kabi yaltiraydi. Qattiqligi 3,5. Ulanish tekisligi yo‘q. Solishtirma og‘irligi 4,03-4,18. Kuchli magnit tortishish xususiyatiga ega. Kubanit xalkopirit bilan paragenetik mahkam bog‘langan. Ko‘pincha bornit qattiq eritmalarning parchalanish mahsuloti bo‘lib, xalkopirit orasida mikroskopda ko‘rish

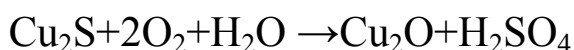
mumkin bo'lgan mayda plastinkachalar holida uchraydi. Birinchi marta kubanit Minas-Jereyda (Braziliya) Morro- Velo oltin rudali kvarts tomirlarida topilgan edi.

Kovellin-CuS yoki $Cu \cdot 2S \cdot Cu \cdot S_2$. Mineral italyan mineralshunosi Kovelli nomi bilan atalgan. Sinonimi: mis zangorisi. Kimyoviy tarkibi Cu 66,5%, S 33,5%. Kimyoviy tekshirishlar Fe, kamroq Se, Ag va Pb aralashmasi borligini ko'rsatadi. Agregatlari. Kovellin ko'pincha och zangor rangli yupqa po'st yoki ko'kimtir-qora ragnli kukun va qurum kabi massalar bo'lib topiladi. Kovellin rangi zangor. Uning chizig'ikulrang ham qoradir. U shaffof emas. Kovellinning juda yupqa varaqchalari yashil bo'lib, nur o'tkazadi. U metalldek yaltiraydi. Qattiqligi 1,5-2. Kovellin mo'rtdir. Uning yupqa plastinkachalari qisman egiluvchan. Ulanish tekisligi {0001} bo'yicha mukammal. Solishtirma og'rligi 4,59-4,67.

Diagnostik belgilari. Kovellin ochiq zangor rangi, kichik qattiqligi va mis sulfidlari bilan bir assotsiyatsiyada topilishiga qarab oson bilinadi.

Kuprit-Cu₂O. Mineralning nomi lotincha "cuprum" – mis so'zidan kelib chiqqan. Sinonimi: qizil mis rudasi. G'ishtsimon mis rudasi (tarkibida temir gidroksidlari aralashmasi bor) va qatronsimon mis rudasi (tarkibida kremnozyom va temir gidroksidlari aralashmasi bor) haqiqatda kaloidal mineral aralashmalardan iborat. Kimyoviy tarkibi Cu 88,8%. ko'pincha mexanik aralashmalar sifatida sof tug'ma mis borligi, yashirin kristallangan xillari tarkibida esa Fe₂O₃ va H₂O borligi aniqlangan. Kupritning rangi qizil, qo'rg'oshin - kulranglari mayin. Chizig'ijigarrang - qizil yoki qo'ng'ir - qizil. Kristallari singan joylarida olmosga yoki yarim metallga o'xshab yaltiraydi. Kupritning yupqa bo'laklari yarim shaffof bo'ladi. Qattiqligi 3,5-4. Ulanish tekisligi {111} bo'yicha aniq. Solishtirma og'rligi 5,85-6,15.

Diagnostik belgilari. Xarakterli xususiyatlari quyidagilardir: olmosdek yaltiraydi. Qizil chiziq beradi, ayniqsa, sof tug'ma mis, ba'zan misning ikkilamchi minerallari – malaxit, azurit va boshqalar bilan bir paragenezisda topiladi. Kuprit deyarli faqat mis konlarining ikkilamchi sulfidli boyish zonasida (grunt suvlari sathidan pastda) keng tarqalgan xalkozin, goho bornit rudalarining oksidlanishi natijasida ekzogen jarayonlarda paydo bo'ladi. U, asosan, ma'lum sabablarga ko'ra (jumladan, eroziya bazisining pasayishi natijasida) grunt suvlari sathi pasayib, avval paydo bo'lgan xalkozinga boy zona oksidlanish doirasiga tushib qolgan paytlardagina kuprit ko'p tarqaladi. Xalkozinning oksidlanish jarayoni ajralib chiqqan sulfat kislotaning suvda erishi natijasida quyidagi reaksiya bo'yicha ro'y beradi:



Bu reaksiya uchun kislorod yetishmagan holda Cu_2O o'rnida yoki u bilan birga sof toza mis yuzaga kelishi mumkin.

Tenorit – CuO . Cu 79,9%, C 20,1%. Sinonimi: melakonit (massiv yaxlit xili). Singoniyasi monoklin. Juda kam uchraydi. Odatda, mayda tangachasimon agregatlar holida uchraydi. Rangi qora yoki kulrang-qora. Chizig'ikulrang - qora. Yaltirashi yarim metallga o'xshaydi. Jilolangan shliflarda kuchli anizotrop tusda ko'rinadi. Qattiqligi 3,5 ga teng. Mo'rt. Solishtirma og'irligi 5,8-6,4.

Malaxit – $\text{Cu}_2[\text{CO}_3][\text{OH}]_2$ yoki $\text{CuCO}_3 \cdot \text{Cu}[\text{OH}]_2$. Grekcha "malaxe"- gulxayri demakdir. Shu o'simlik rangiga o'xshaganligi uchun shunday nom berilgan. Kimyoviy tarkibi CuO 71,9% (Cu 57,4%), CO_2 19,9%, H_2O 8,2%. Juda kam miqdorda CaO, Fe_2O_3 , SiO_2 va boshqalar borligi ham aniqlanadi. Malaxitning rangi yashil. Chizig'ioch yashil. Yaltirashi shishadek, olmosdek, tolasimon xillarida ipakdek. Qattiqligi 3,5-4. Mo'rt mineral. Ulanish tekisligi {201} bo'yicha mukammal, {010} bo'yicha o'rtacha. Solishtirma og'rligi 3,9-4,0.

Diagnostik belgilari. O'ziga xos yashil rangiga, ko'pincha, oqiq shaklda bo'lishiga va tolalarning radiak shu'la kabi tuzilishiga qarab oson bilinadi. O'ziga birmuncha o'xshab ketadigan xrizokolla (mis gidrosilikati) dan fosforkalsitdan (mis fosfati) va boshqa misning yashil rangli minerallaridan xlorid kislotada o'zgarishiga qarab ajratiladi. Malaxit faqat mis sulfidi konlarining oksidlanish zonasida paydo bo'ladi; ayniqsa, agar ular ohaktoshlar orasida yotgan bo'lsa yoki birlamchi rudalar tarkibida karbonatlar ko'p bo'lsa, uning paydo bo'lishi uchun qulay sharoit vujudga keladi. Oksidlangan mis rudalarida eng ko'p tarqalgan mineral hisoblanadi.

Amaliy ahamiyati. Malaxitning, ba'zan, katta massalar holida topiladigan oqish shakldagi xillari har xil bezak ishlarida qo'llaniladi va hashamdor buyumlar – guldonlar, qutichalar, stollar ishlanadi. Malaxitning mayda kukunlari bo'yoq tayyorlash uchun ishlatiladi.

Azurit – $\text{Cu}_3[\text{CO}_3]_2 [\text{OH}]_2$ yoki $2\text{CuCO}_3 \cdot \text{Cu}[\text{OH}]_2$. Nomi fransuzcha "azure"- lojuvard, havorang so'zidan kelib chiqqan. Sinonimi: mis koki(mis lazuri). Kimyoviy tarkibi - CuO 69,2% (Cu 55,3%), CO_2 25,6%, H_2O 5,2%. Kristallari kimyoviy jihatdan toza. Mayda kristallar druzasi, yaxlit donador massalar, ba'zan radial shu'la kabi tuzilgan agregatlar va tuproqsimon holatda topiladi. Azuritning rangi to'q ko'k, tuproqsimon massalari havorang. Chizig'ihavorang. Yaltirashi shisha kabi. Qattiqligi

3,5-4. Ulanish tekisligi {001} bo'yicha mukammal, {100} bo'yicha mukammal emas. Solishtirma og'irligi 3,7-3,9.

Diagnostik belgilari. O'ziga xos ko'k rangiga va malaxit ham misning boshqa kislorodli birikmalari bilan bir assotsiatsiyada topilishiga qarab osonlikcha bilinadi.

Amaliy ahamiyati. Misning boshqa kislorodli birikmalari bilan birga metallurgiya pechlarida mis eritish uchun ishlatiladi. Toza azurit agar kattaroq massalar bo'lib topilsa, ko'k bo'yoq tayyorlash uchun ishlatiladi.

Feruz – $\text{CuAl}_6[\text{PO}_4]_4[\text{OH}]_8 \cdot 5\text{H}_2\text{O}$. Sinonimi: kallait (feruzaning qadimiy nomi). Temirga boy (Fe_2O_3 20-21%) xili rashleit deb atalgan. Kimyoviy tarkibi – CuO 9,57%, Al_2O_3 36,84%, P_2O_5 34,12%, H_2O 19,47%. Bundan tashqari yana har xil aralashmalar ham bo'ladi. Singoniyasi triklin; simmetriya ko'rinishi pinakoidal. Ko'pincha yashirin kristallangan massa holida buyraksimon shakllar yoki qobiq tomirchalar va noto'g'ri shaklli buyumlar holida tarqaladi. Feruzaning rangi havorang - ko'k, olmadek yashil, yashilroq kulrang. Yaltirashi mum kabi. Qattiqligi 5- 6. Ancha mo'rt. Ulanish tekisligi {001} bo'yicha mukammal, {010} bo'yicha o'rtacha. Singan yuzasi bir oz chig'anoq sirtiga o'xshab ketadi. Solishtirma og'irligi 2,60-2,83.

Diagnostik belgilari. Rangi va mum kabi yaltirashi xarakterlidir.

Lekin ko'p paytlarda o'ziga o'xshagan xrizokolla bilan misning boshqa minerallaridan ajratish uchun kimyoviy reaksiyalar o'tkazish lozim. Feruz nurash sharoitlarida yer yuzidagi misli eritmalarning glinozem (dala shpatlarida va boshqalarda) bilan fosfoga (apatit va boshqa birikmalardagi) boy bo'lgan tog' jinslariga ta'sir etishidan, ko'pincha limonit bilan birga hosil bo'ladi. Feruzaning hayvonlarning qazilma suyagi va tishi hisobiga paydo bo'lgan hollari ham ma'lum ("suyak feruz" yoki odontolit). Eng yaxshi feruz bir necha yuz yillar davomida madan konidan (Erondagi Nishopur shahri yaqinida) chiqarilar edi. Bu yerda u limonit bilan birga nurab ketgan magmatik jinslar – traxitlar orasida noto'g'ri shaklli buyumlar va yupqa tomirchalar bo'lib yuzaga keladi. Feruz qimmatbaho tosh sifatida bu yerdan Turkiya orqali Yevropaga yuborilar edi. Bundan tashqari Vadi-Magara (Sinay yarim orolida) va Qora Tepa (Samarqanddan janubda) kabi konlari bor. Feruzaning rangi chiroyli (havorang-ko'k), uning xillaridan bezak buyumlari tayyorlanadi.

Xrizokolla – $\text{CuSiO}_3 \cdot n\text{H}_2\text{O}$ $n=2$ ga yaqin. Grekcha "xrizos"- oltin, "kolla" - yelim demakdir. Kimyoviy tarkibi o'zgaruvchan. Tarkibida ko'pincha Al_2O_3 17% gacha (pilarit), Fe_2O_3 7% gacha, P_2O_3 7-9 %

(demidovit) aralashmalari bo'ladi. Singoniyasi ma'lum emas. Xrizokolla, ko'pincha, tipik kolloiddan iborat bo'ladi. Sirti oqiq, ba'zan kovak po'stloq shaklida bo'lgan ovalsimon, shuningdek, tuproqsimon buyumlar holida uchraydi. Xrizokollaning rangi havorang, yashil yoki ko'k, qo'ng'ir (temir gidroksidlari aralashmasi bo'lganligidan) va hattoki qora tovlanadi. Birmuncha toza xillarining chizig'iyashil-oq. Opalga o'xshash xillari shishadek yaltiraydi, ba'zan mumsimon xira. Qattiqligi 2, ba'zan 4 bo'ladi. Notekis, chig'anoqsimon yuzalar bo'yicha sinadi. Solishtirma og'irligi 2,0-2,3. Tarkibidagi suvning birqismi 1100 gacha qizdirganda, qolgan qismi ancha yuqori haroratda ajralib chiqadi.

Diagnostik belgilari. Kollomorf massa bo'lishiga, havorang-yashil tusiga va ortiqcha qattiq emasligiga qarab bilinadi. Dahandam alangasida erimaydi, alanga yashil rangga kiradi. Kolbada osonlikcha suvi ajralib, qorayib qoladi. Kislotalarda parchalanadi va kukun holatida bo'lgan kremnozyom ajraladi. Xrizokolla mis konlarining oksidlanish zonasi uchun xos tipik mineral bo'lib, quruq issiq iqlimli joylarda keng tarqalgan.

Xrizokollaning malaxit, azurit, atakamit, libetenit, serustit, kalsit va boshqa minerallar o'rnida paydo bo'lgan psevdomorfozlari topilgan. Xrizokollaning sekin-asta tarkibida suvi ozroq bo'lgan mis silikatiga (plansheitga) aylana borishi ham aniqlangan.

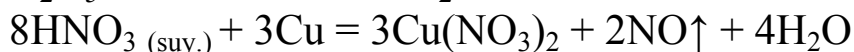
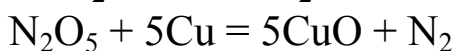
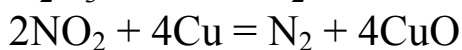
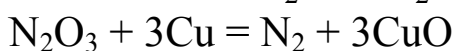
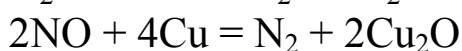
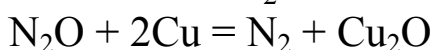
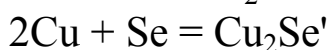
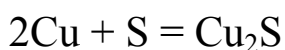
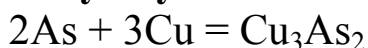
Ishlatilishi. Misli qotishma va turli birikmalari 50 dan ortiq mahsulotlarni o'z ichiga oladi. Jami ishlab chiqarishda misning 40% turli mis qotishmalaridan foydalaniladi. Mis va ruxdan tayyorlangan latundan harxil mislar, quvur, soatlar mexanizmi va detallari tayyorlansa, mis va qalay qotishmalaridan tayyorlangan bronzadan esa turli podshipniklar, halqalar va yuqori quvvatli transportning detallari tayyorlanadi. Elektrotexnikada elektr simlari tayyorlash uchun, metallurgiyada turli qotishmalar tayyorlash uchun va katalizator sifatida ishlatiladi; mis birikmalari qishloq xo'jaligi zararkunandalariga qarshi kurashda, mineral bo'yoqlar sanoatida va boshqa maqsadlarda ishlatiladi. Mis elektr va issiqlik o'tkazuvchanligining yuqoriligi, elastikligi va korroziyabardoshligi uning qaysi sohalarda ishlatilishini belgilab beradi. Qazib olinadigan misning taxminan 50%i elektrotexnika sanoati ehtiyojlari uchun ishlatiladi. Aluminiyli mis bronzalaridan asosan yuqori zangdan saqlovchi xususiyatga ega bo'lgan aviatsiya dvigatellarida, quvur va boshqa sohalarda qo'llaniladi. Shuningdek, nikel va ruxli mis aralashmasidan tayyorlangan melxlor qotishmasi uy-ro'zg'or buyumlari tayyorlashda, tibbiyotda jarrohlik asboblari yasashda keng qo'llaniladi.

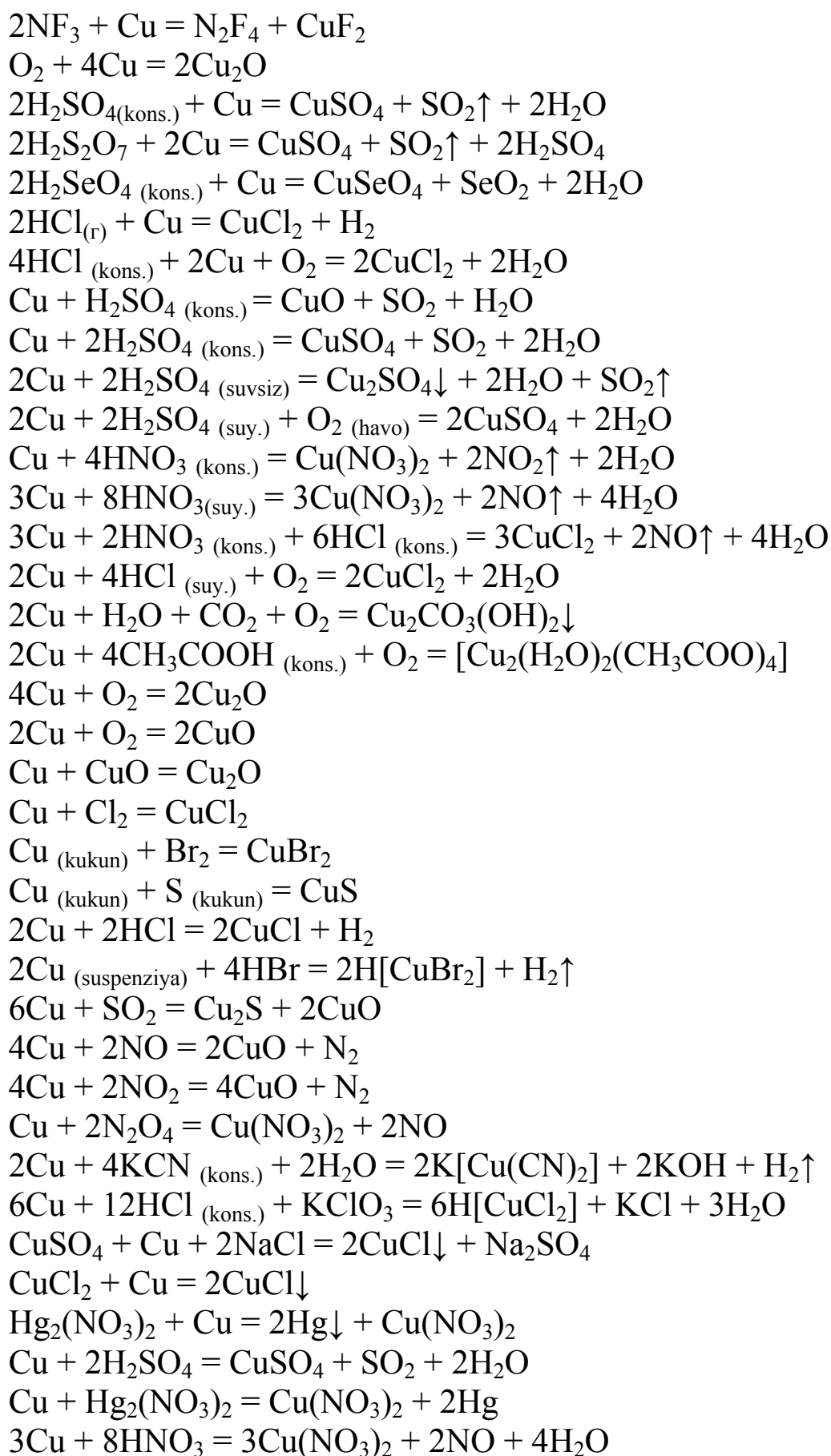
Marganes, nikelli mis birikmalari – nikelin va marganin kabi elektr qarshiligi yuqori bo‘lgan qotishmalar elektrotexnikada ishlatiladi.

Qotishmalari tarkibida qalay, rux, Aluminiy, qo‘rg‘oshin, nikel, marganes, temir, fosfor, kremniy va boshqa elementlar bo‘lgan mis asosidagi qotishmalardir. Mis qotishmalari latun, bronza va mis-nikel qotishmalarga bo‘linadi. Legirlovchi komponentlariga ko‘ra mis qotishmalari yuqori elektr o‘tkazuvchanlikka va issiqlik o‘tkazuvchanlikka ega bo‘lishi, plastik va mustahkam, antifraksion va korroziyabardosh bo‘lishi mumkin. Mis keyingi paytlarda tarkibida oltini bor qotishma sifatida ham keng qo‘llanilmoqda. Unda mis 85%, rux 12%, qalay 2% va oltin 1% bo‘lib, ko‘pgina oltinli qotishmalar xalq xo‘jaligining turli tarmoqlarida ishlatilmoqda. Neyzilber (65% mis), konstantan (59% mis), melxlor (68% mis), oddiy bronza (90% mis), oddiy latun (60-70% mis) kabi qotishmalari ko‘pchilikka yaxshi tanish.

Olinishi. Konlarda 0,3-1% gacha misli ruda flotatsiya usuli bilan boyitilib, misli boyitma olinadi (Cu - 16-25%). Mayda, kukunli boyitma shteyn olish uchun 1275-1350⁰C haroratli pechlarda eritiladi. Nokerak tog‘ jinslari toshqolga o‘tib, alohida joyda saqlashga jo‘natilsa, suyuq holdagi shteyn (Cu - 26-40%) yuqori bosim ostida havo yordamida konvertorlanadi. Tarkibidagi temir va nokerak ikkilamchi elementlar toshqolga o‘tadi. Olingan xomaki mis yuqori haroratda (1250-1275⁰C) olovli tozalanadi, so‘ng qoliplarga quyiladi. O‘zbekistonda faqat Olmaliq tog‘ hududlari bo‘lmish Sariqcho‘qqi va Qalmoqqir konlaridan misli ruda ochiq usulda qazib olinib, mis eritish zavodida toza sof holda ajratib olinib, suvda sovutiladi va elektroliz usulibilan sof 99,99% toza mis katodlari olinadi. Shuningdek, misli ruda ko‘proq oksidli holatda bo‘lsa, uyumli, bakteriyali, yer osti usullari bilan kislotalar yordamida tanlab eritiladi.

kimyoviy xossalari:





Rux -Zn

RUX: belgisi - Zn. Rux (lot. Zincum), (nem. Zink; XVI-XVII asrda yashagan olimlar asarlarida uchraydigan termin), qadimdan ma'lum kimyoviy element, davriy sistemaning II guruh kimyoviy elementi, tartib raqami 30, atom massasi 65,37, och zangori-oq rangli metall; zichligi $7,130 \text{ g/cm}^3$; $t_{\text{suyuq}}=419,5^{\circ}\text{C}$, $t_{\text{qayn}}=907^{\circ}\text{C}$, yaltiroq och ko'kintir, geksagonal kristallik metall, havoda oksid va gidroksikarbonat bilan qoplanadi, bu qavat uni oksidlanishdan saqlaydi, suvda erimaydi, kislota va ishqorlarda eriydi.

Ruxlash – po'lat va cho'yan buyumlarni korroziyadan saqlash uchun ularning sirtini rux qatlami bilan qoplash. Rux issiqlayin (buyumni erigan ruxli vannaga tushirib) elektrolitik usulda, erigan ruxni purkab amalga oshiriladi.

Minerallari. Rux tabiatda keng tarqalgan; muhim minerali – sfalerit ZnS (yaltiroq ruxtosh), franklanit $(\text{Zn},\text{Mn}) \text{Fe}_2\text{O}_4$, smitsonit - ZnCO_3 , marmatit Zn_2FeS_3 .

Sfalerit ZnS - Mineralning nomi grekcha “sfaleros”- aldamchi so'zidan olingan. Bu mineral tashqi belgilarining rasmiy sulfidlarga hech o'xshamasligi sababli shunday nom bilan atalgan. Uning sinonimi: rux aldamchisi hisoblanadi. Sfaleritning xillari, kleyofan – oq rangli yoki rangsiz (deyarli butunlay aralashmalardan xoli) bo'lgan xili; marmatit – sfaleritning qora rangli temir aralashgan xili; poshibramit – kadmiyga boy (Cd 5% gacha) xili bor. Kimyoviy tarkibi- Zn 97,1%, S 32,9%. Aralashma sifatida ko'proq Fe (20% gacha) bo'ladi; shunday xilini mikroskopda qattiq eritmaning parchalanishi mahsuloti bo'lgan mayda pirrotin (FeS) aralashmasi borligi ko'rinadi. Sfaleritning rangi odatda qoramtir yoki jigarrang; ko'pincha qora (marmatit), kamdan-kam sariq, qizil va yashilroq bo'ladi. Butunlay rangsiz shaffof xili (kleyofan) ham bor. Uning chizig'ioq yoki och sariq va qoramtir tuslarga bo'yalgan, temirga boy turi jigarrang chiziq beradi. Olmos kabi yaltiraydi. Qattiqligi 3-4. Sfalerit ancha mo'rtdir. Uning ulanish tekisligi $\{110\}$ bo'yicha o'ta mukammal. Solishtirma og'irligi 3,9-4. Sfalerit elektr o'tkazmaydi va qutbli termoelektrlanish xususiyatiga ega. Uning ayrim xillari ishganda va singanda fosforensiyalanadi. Oksidlantiruvchi alangada ko'mir ustida oq rangli rux oksidi gardlari hosil qiladi. Suyultirilmagan HNO_3 da eriydi va oltingugurt ajralib chiqadi.

Vyursit – ZnS. Xillari: eritrotsikit – tarkibida marganes bo‘lgan vyursit (Zn, Mn) S. Kimyoviy tarkibi sfaleritnikiga o‘xshashdir. Odatda tarkibidagi kadmiy sfaleritdagiga qaraganda ko‘proq miqdorda bo‘ladi. Vyursitning rangi sfaleritniki singari asosan tarkibidagi temirga bog‘liq o‘zgaruvchan, och ham, qo‘ng‘ir ham bo‘ladi. Shunga muvofiq chizig‘i ham rangsizdan qo‘ng‘irga o‘zgaradi. Yaltirashi olmosga o‘xshaydi. Qattiqligi 3,5-4. Vyursit mo‘rtidir. Uning ulanish tekisligi {1120} bo‘yicha mukammal va {0001} bo‘yicha mukammal emas. Solishtirma og‘irligi 4,0-4,1.

Diagnostik belgilari. Vyursitning yaxlit massalarini tashqi ko‘rinishiga qarab sfaleritdan ajratib bo‘lmaydi.

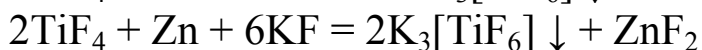
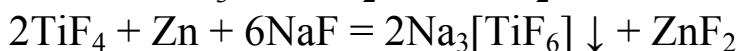
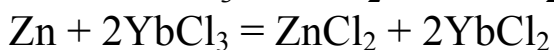
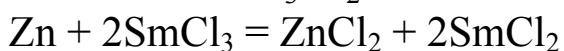
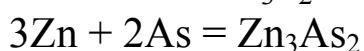
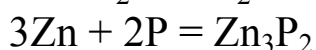
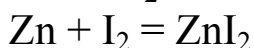
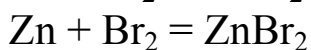
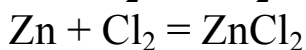
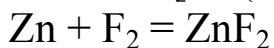
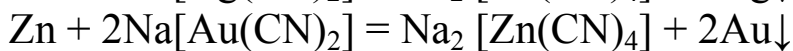
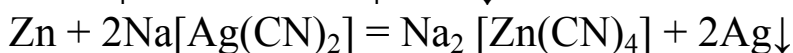
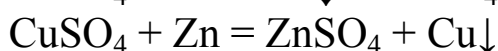
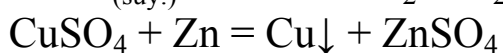
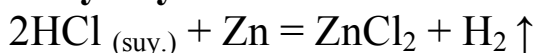
Sinkit – ZnO. Zn 80,3%, O 19,7%. Singoniyasi geksagonal; simmetriya ko‘rinishi digeksagonal - dipiramidal. Kristall strukturasi vyursitipida. Xol-xol donalar va yaxlit massalar holida uchraydi. Rangi qizg‘ishsariq yoki to‘q qizil. Chizig‘i qizg‘ish-sariq. Olmos kabi yaltiraydi. Optik jihatdan musbat. Qattiqligi 4 ga teng. Ulanish tekisligi {1010} bo‘yicha o‘rtacha. Solishtirma og‘irligi 5,66.

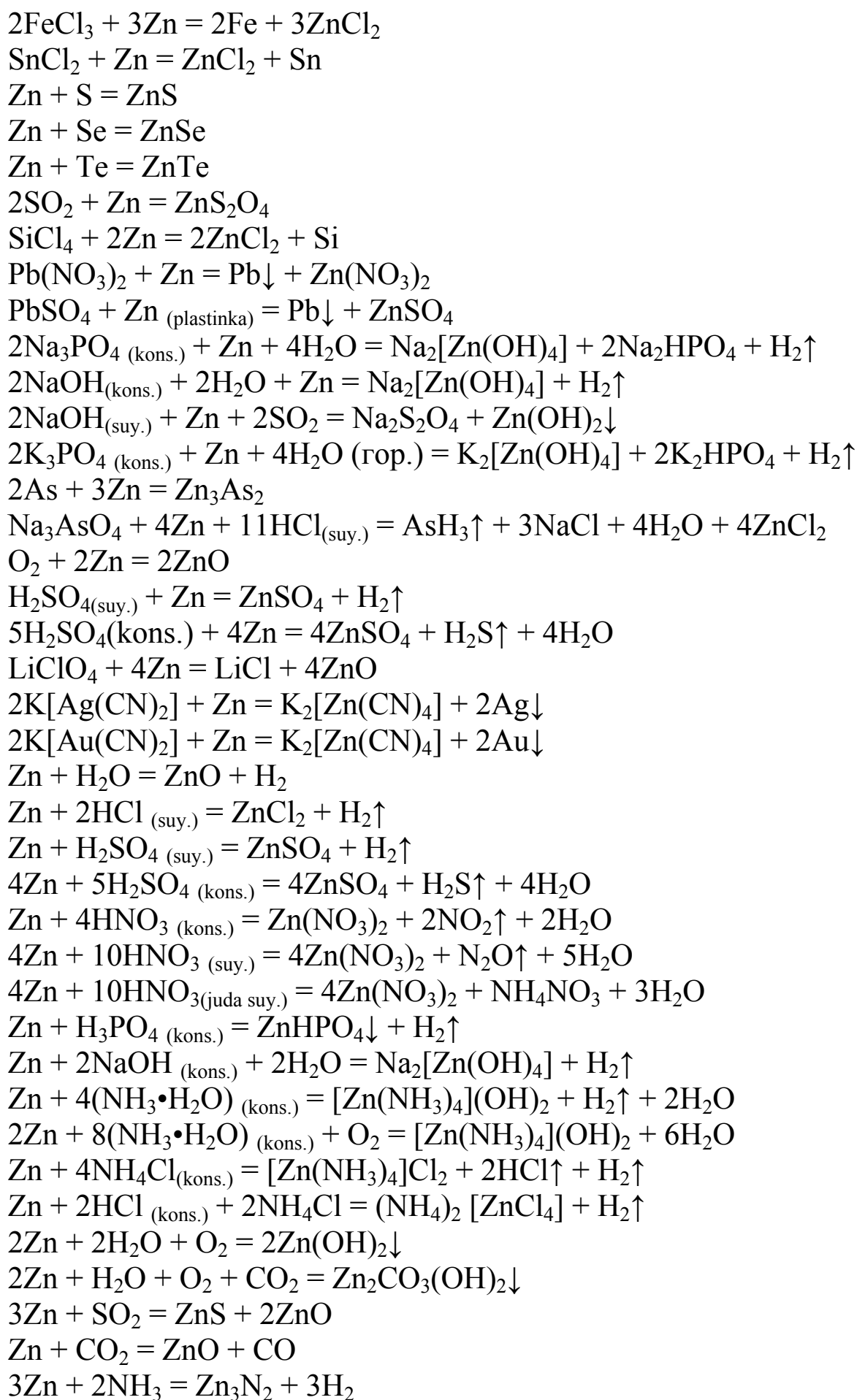
Ishlatilishi. Rux dunyoda ishlab chiqarish hajmi bo‘yicha metallurgiyada po‘lat (temir), Aluminiy va misdan keyin 4-o‘rinda turadi. Uning ishlatilish sohasi borgan sari kengayib bormoqda. Rux nafaqat sof metal holida, balki xlorid, oksid, sulfat va ruxli kukun holida ham keng qo‘llaniladi. Dunyoda jami ruxning 47% dan ortig‘i metallarni ruxlash uchun ishlatiladi. Metallurgiyada temir va po‘latlarni galvanik qoplash orqali ularni zanglashdan saqlaydi. 19% rux latun va bronza ishlab chiqarishda foydalanilsa, 14% rux turli ruxli qotishmalar ishlab chiqaradi. Ruxning o‘rtacha 1 tonnasi oxirgi yillarda 1000 AQSH dollaridan (2004-yildan) 4400 AQSH dollariga ortib ketdi (2007-yil). Rux po‘lat buyumlarni korroziyadan saqlash uchun ular sirtini qoplash (ruxlash) da va ko‘pgina qotishmalar, masalan, misli qotishma(latun) tayyorlashda ishlatiladi. Rux birikmalaridan zaharsiz va yaxshi qoplanadigan bo‘yoqlar: ZnO (rux oksidi) - ruxli belila, ZnS (rux sulfid) -litopon tayyorlashda foydalaniladi. ZnS rux sulfidning CdS kadmiy sulfid bilan aralashmasi (lyuminessent xossalari) dan televizion trubkalar va ekranlar tayyorlashda qo‘llaniladi. Uy jihozlari tayyorlashda, ruxlashda, galvanik elementlar va qotishmalar tayyorlashda ishlatiladi.

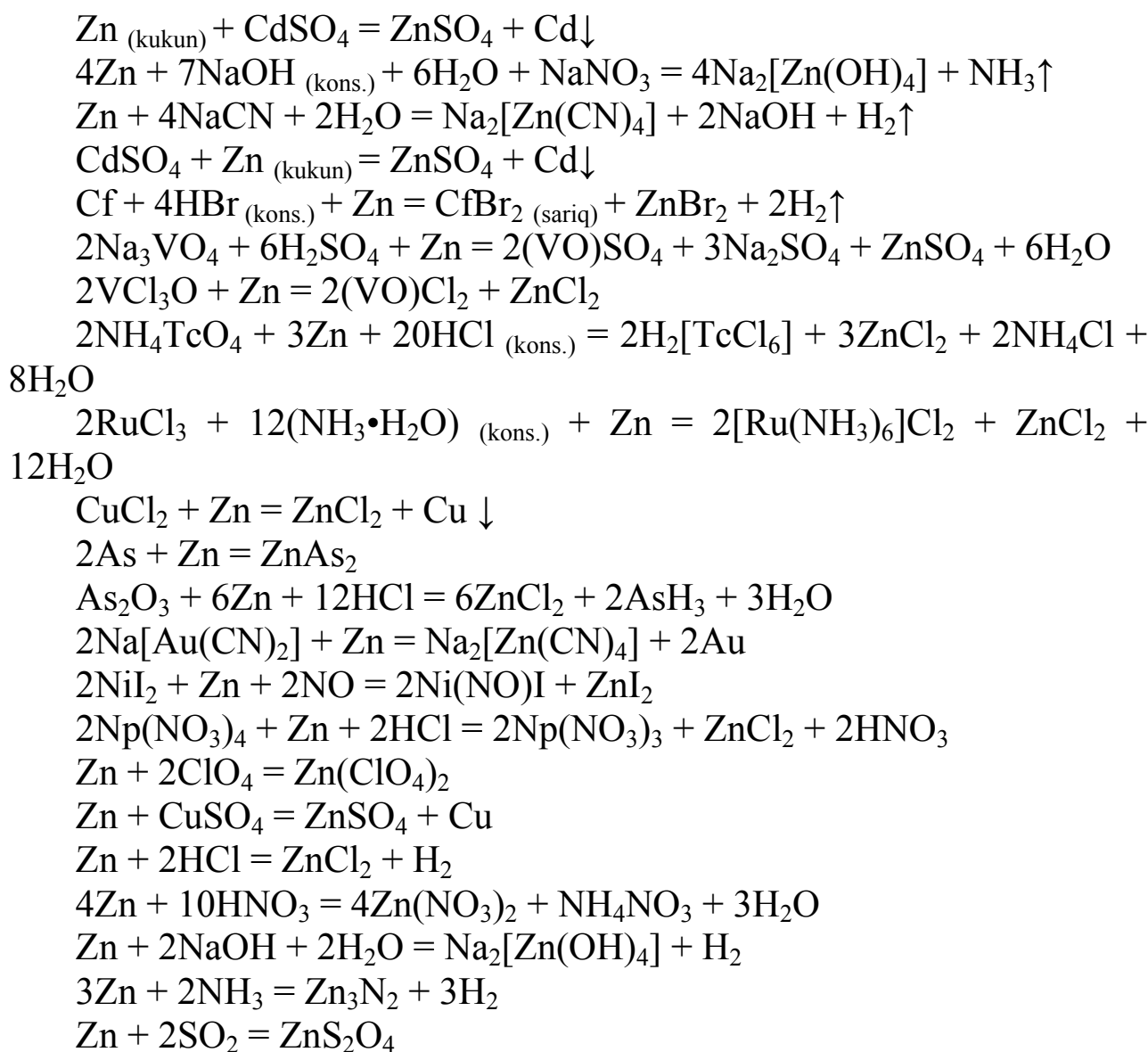
Qotishmalari - rux asosidagi Aluminiy, mis va magniy qotishmalari, karbyurator va nasoslarning korpuslari, sirpanish podshipniklarining ichki halqasi, badiiy buyumlar quyishda ishlatiladi.

Olinishi. Ruxli rudalar kondan asosan yer osti va yer usti usullari bilan qazib olinadi. So‘ng ular uch bosqichda maydalanib, un holiga keltiriladi (0,074 mm maydalikda kamida 90%). Asosan ruxli boyitmalar gidrometallurgiya usuli bilan qayta ishlanadi. Pirometallurgiya jarayoni garchi kam bo‘lsada (Belova shahrida), sanoatda qo‘llanib kelinmoqda. Ruxning erish harorati past bo‘lganligi uchun ham ($t_{er}=419,5^{\circ}\text{C}$) yuqori haroratda rux bug‘ holatiga o‘tkazilib, so‘ng erish haroratigacha sovutiladi, keyin nokerak tog‘ jinslaridan tozalanib, qayta ishlanadi. Lekin ko‘pgina joylarda gidrometallurgiya jarayoni keng qo‘llaniladi. Biroq unda kam qaynovchi qatlam (KS) pechlarida sulfid holidagi rux kislotalarda eriydigan holatida yuqori haroratda o‘tkaziladi. Tarkibida 0,5-1,5 % li ruxli rudalar flotatsiya usuli bilan boyitil-gach, rux miqdori 46-55% ga ko‘tariladi va ushbu sulfidli rux boyitmasi kuydirish pechlarida $900-1000^{\circ}\text{C}$ da kuydirilib, oltingugurtli rux birikmasi to‘liq oksid holiga o‘tkaziladi (ZnO). Olingan kuyindi H_2SO_4 da tanlab eritiladi va rux sulfat hoida eritmaga o‘tkaziladi. Uch bosqichli gidrolitik tozalash yordamida ikkilamchi nokerak unsurlardan tozalangach, eritma elektroliz yordamida katodda cho‘kma hosil qilib, eritmadagi rux qattiq holda katodga jiplashadi. Ushburuxli katod induksion pechlar yordamida $450-550^{\circ}\text{C}$ da eritilib, sof quyma rux metalli olinadi. O‘zbekistonda rux faqat Olmaliq tog‘ metallurgiya kombinatidagi rux zavodida qayta ishlanib, toza rux metall hoida olinadi.

kimyoviy xossalari:







Galliy - Ga

GALLIY: belgisi - Ga. 1875-yilda fransuz kimyogari Lekok de Buabodran tomonidan rux tarkibidan spektr usuli bilan topildi.

(Yunon. Gallia - Galliya, Fransiyaning eski nomi), (lot. Gallium), davriy sistemaning III guruh elementi, tartib raqami 31, atom massasi 69,72. Galliy kumushdek oq tetragonal kristall, yumshoq metall; $t_{\text{suyuq}}=29,8^{\circ}\text{C}$, $t_{\text{qayn}}=2205^{\circ}\text{C}$, zichligi $6,0947 \text{ g/sm}^3$, ikki izotopdan iborat Ga^{60} (60,5%), Ga^{71} (39,5). Sun'iy olingan radioaktiv izotoplari ham bor. 1871-yilda D.I.Mendeleyev 31 raqamli elementning borligini va xossalarini o'zi kashf etgan davriy qonunga asoslanib, oldindan aytgan edi.

Minerallari. Yer kurrasida uning tarkibi $1,5 \cdot 10^{-3}$ (og'irligi bo'yicha) boshqa minerallarda uchraydi. Izomorf qo'shimcha bo'lib, masalan,

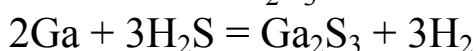
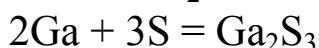
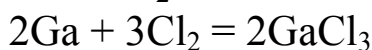
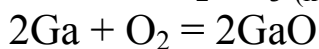
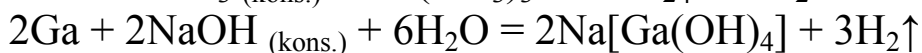
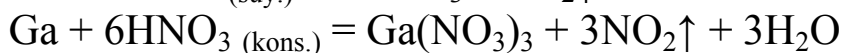
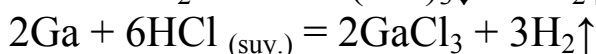
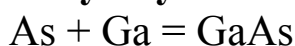
Aluminiy, temir, rux aldamasi mineralida uchraydi. Germanit mineralida galliyning yuqori miqdori uchraydi. Boksit va nefelinda galliy miqdori 0,04 dan 0,001% gacha bo‘ladi. Ko‘mirda galliy germaniy bilan uchraydi. Ko‘mir kulida esa 0,1 dan 0,001% gacha bo‘ladi.

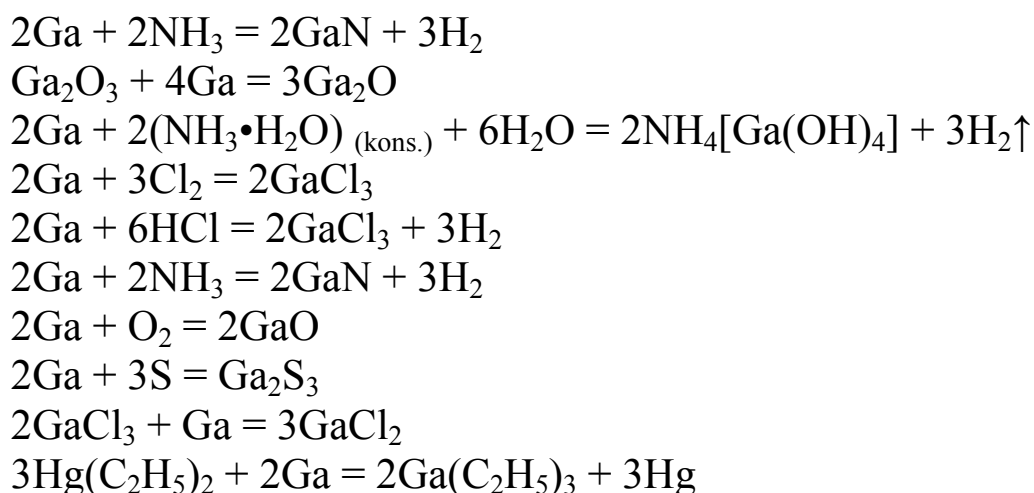
Ishlatilishi. Termometrlar va optik ko‘zgular tayyorlashda ishlatiladi; birikmalari zaharli, bularning fiziologik ta’siri simob va margimush birikmalaridan kuchliroq; tibbiyotda ishlatiladi. Yarim o‘tkazgich elektronikasida galliyning qotishmalari amalgama shaklida bo‘lib, stomatologiya sohasida ishlatiladi.

Qotishmalari. Galliy elementining kadmiy va qalay elementlari bilan qotishmalari mavjud.

Olinishi. Tabiatda galliy tarqoq holda, asosan, Aluminiy minerallarida uchraydi va ulardan olinadi. Galliy izlari rux rudalarida ko‘p bo‘ladi, bundan tashqari toshko‘mir kullarida galliy miqdori anchagina aniqlangan (1,5 gacha). Galliy tabiatda Aluminiyning yo‘ldoshi bo‘lib, asosan, Aluminiy sanoatidagi mahsulotdan ajratib olinadi. Asosiy xomashyo glinozyomni qayta ishlash mobaynida boksitlar tanlab eritilganda galliy eritmaga o‘tadi. Eritma karbon oksidi (karbonlash) bilan bir necha bor purkalanib, galliyni cho‘kma holiga cho‘ktiradi va qayta eritadi. Natijada $\text{Al}(\text{OH})_3$ eritmada kamayib borsa, galliy esa eritmaga o‘tadi. Olingan eritma yana qayta karbonlanadi va galliy cho‘ktiriladi. Cho‘kma NaOH da eritilgach, ikkilamchi qo‘shimcha kimyoviy elementlardan tozalanadi, so‘ng eritma elektrolizga jo‘natilib, elektr toki yordamida galliy metall holida ajratib olinadi. Ikkinchi usul – Aluminiy-anodli qotishma ham galliy uchun xomashyo hisoblanib, u $700-800^\circ\text{C}$ harorat ostida kuydiriladi, so‘ng ishqor yordamida qayta ishlanib, yuqorida qayd etilgan texnologiya orqali ajratib olinadi.

kimyoviy xossalari:





Germaniy - Ge

GERMANIY: belgisi - Ge. Davriy sistemaning IVguruh kimyoviy elementi (lot. Germanium), tartib raqami 32, atom massasi 72,59. Bu element 1886-yilda kashf etilgan. D.I.Mendeleyev 1870-yilda o‘zining mashhur davriy qonuniga asoslanib, bu elementning borligini va xossalarini oldindan aytib bergan edi. Germaniy och kulrang metall; zichligi 5,33 g/sm³, $t_{\text{suyuq}}=1938,2^0\text{C}$, $t_{\text{qayn}}=2847^0\text{C}$, suvda erimaydi, qaynoq H₂SO₄ da va zar suvida eriydi. Germaniy eng qimmat yarim o‘tkazgichlardan biri hisoblanadi. Germaniy diod va triodlar zamonaviy elektron asboblari (cho‘ntak radio priyomniklaridan tortib, ulkan hisoblash mashinalarigacha) ning asosiy tarkibiy elementlari hisoblanadi. Germaniyning beshta stabil va bir nechta sun‘iy yo‘l bilan olingan radioaktiv izotopi bor. Germaniy yarim o‘tkazgich sifatida katta ahamiyatga ega.

Minerallari. Argirodit Ag₈GeS₆ tarkibida 5-7% germaniy mavjud, germaniy (Cu, Fe, Ge, Ga, Zn), (S, As)₄ tarkibida 6-10% Ge, 6-8% Fe, 0,5-0,8% Ga. Bu mineral 1918-yili mis, qo‘rg‘oshin, rux rudasida aniqlangan. Renierit (Cu, Fe)₃ (Fe, Ge, Zn, Sn) (S, As)₄ tarkibida 6,37-7,8% germaniy mavjud. Sulfidli rudalardan tashqari toshko‘mir germaniy manbai bo‘lib hisoblanadi, uning miqdori toshko‘mirda 0,001% dan 0,01% gacha. Yuqoridagi minerallardan tashqari germaniy temir rudalari tarkibiga ham kiradi, uning miqdori taxminan 0,01% ni tashkil qiladi. Tabiatda germaniy tarqoq element, uning asosiy qismi rangli metallarning sulfid rudalari va ba’zi temir rudalariga aralashgan holda uchraydi.

Ishlatilishi. Germaniy elektrotexnika va radiotexnikada chala o‘tkazgich sifatida ishlatiladi. Elektr sanoatida germaniyli to‘g‘rilagichlar

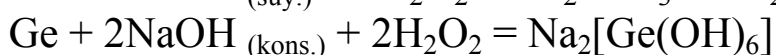
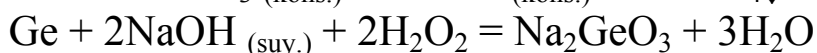
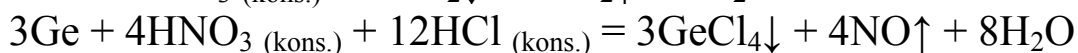
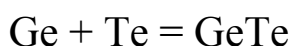
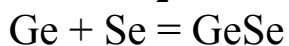
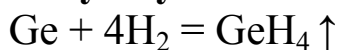
katta quvvatli o'zgaruvchan tokni o'zgarmas tokka aylantirish uchun ishlatiladi.

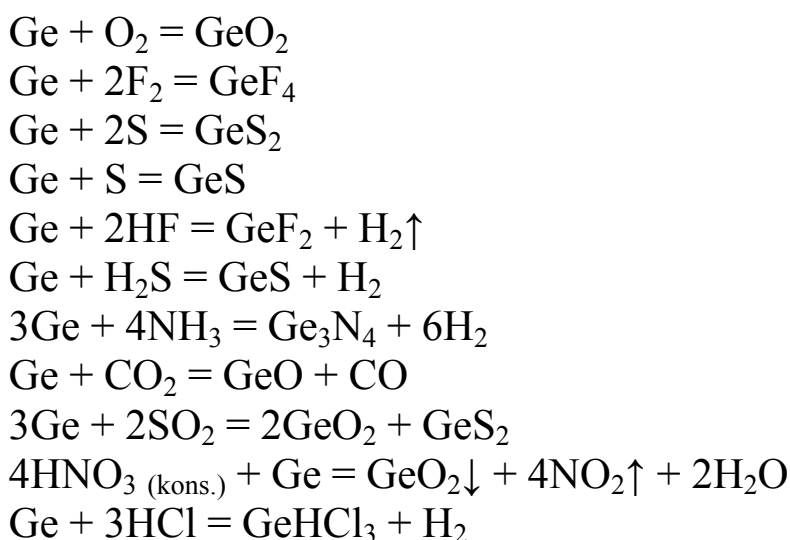
Qotishmalari. Germaniyaning quyidagi qotishmalari mavjud (74% - Aluminiy, 21% - germaniy, 3% - kremniy). Oltin - 3%, germaniy aralashmasi.

Olinishi. Germaniy, asosan, rux, mis, qo'rg'oshin, temir sulfidlari tarkibida juda kam miqdorda uchraydi. Shuningdek, u toshko'mir tarkibida ham uchraydi. Shuning uchun ham ko'mir yongach hosil bo'lgan kul qayta ishlanadi va u asosiy manba hisobida rux ishlab chiqarish sanoatida germaniy tanlab eritish tarkiblarida, asosan, kekda qoladi va veltsoksid bilan gaz holiga o'tadi. Mis sanoatida esa ko'proq chang holiga o'tadi. Ushbu manbalardagi germaniy H_2SO_4 da tanlab eritiladi yoki sulfat holiga o'tkazish uchun kuydiriladi. So'ng ekstraksiya va sorbsiya yordamida boyitiladi. Boyitmadan sof germaniy dioksidini olsa bo'ladi.

Germaniy asosan ko'mirni yondirgach, undan qolgan qoldiq kul tarkibida uchraydi va asosiy xomashyo manbai ko'mir kukuni hisoblanadi. Biroq qisman rux, qo'rg'oshin sanoatidagi chang holida ham uchrab turadi. Texnologiyaning birinchi bosqichi kul tarkibidan germaniyani oksid yoki sulfid holida bug'lantirib ajratib olishdir. Olingan germaniy bug'isovutilib, xloridlanadi. Germaniy to'liq tetraxlorid holiga ($GeCl_4$) o'tgach, xloridlar orasidan u rektifikatsiya yoki ekstraksiya usuli orqali ajratilib tozalanadi. Tozalash bilan birga suvni gidrolitik qayta ishlash bilan ham olib borilib, to'liq gidroksid germaniy holiga o'tkaziladi. Quritilib, harorat ostida parchalangach germaniy oksidi (GeO_2) hosil bo'ladi. Oksid vodorod yordamida harorat ostida qaytarilib, toza germaniy olinadi. Yanada toza yarim o'tkazgichli mahsulot olish uchun zonali eritish yordamida eritilib, sof metall olinadi. Germaniy, asosan, yaltiroq ruxtoshni, yarim metall rudalarini qayta ishlab olinadi.

kimyoviy xossalari:





Mishyak - As

MISHYAK (MARGIMUSH):belgisi - As. XIII asrning o‘rtalarida nemis kimyogari A.Bolshtedskiy birinchi bo‘lib margimushni erkin holda olgan deb hisoblanadi. Davriy sistemaning V guruh kimyoviy elementi, (Arsenicum, lotincha: “arsenu” kuchli demak), tartib raqami 33,atom massasi 74,9216, bir necha shakl o‘zgarishi bor: α – mishyak kulrang romboedrik kristallardan iborat modda, β – mishyak qora amorf modda, d_{20} 4,7; γ - mishyak odatdagi sariq margimushdir, kubik kristallardan iborat modda, d_{20} 3580 da ajraladi; suvda erimaydi, nitrat kislotada eriydi. Eng barqaror allotrop modifikatsiyasi metallsimon yoki kulrang deb ataladi, zichligi $5,720 \text{ g/sm}^3$; $t_{\text{suyuq}}=817^{\circ}\text{C}$, $t_{\text{qayn}}=615^{\circ}\text{C}$ da suyuqlanmay bug‘ga aylanadi.

Minerallari. Mishyakning rangi qalaydek oq. U vaqt o‘tishi bilan ancha tez sariq-qo‘ng‘ir tusga kiradi, keyinchalik esa qorayib qoladi. Chizig‘ikulrang mishyak o‘tkir yaltiraydi, metalldek (yangi singan joyida) tez xiralashadi va vaqt o‘tishi bilan oksidlanib, qorayib qolgan yuzasi butunlay yaltiramaydigan bo‘lib qoladi. Mishyak mo‘rt, uning qattiqligi 3,5. U ulanish tekisligii $\{0001\}$ bo‘yicha mukammal va $\{0112\}$ bo‘yicha mukammal emas. Uning singan yuzasi donadordir. Solishtirma og‘irligi 5,63-5,78.

Diagnostik belgilari - sof tug‘ma mishyak shakli, qorayib qolgan yuzasi, ancha katta solishtirma og‘irligi, singanda metall kabi o‘tkir yaltirashi va mukammal ulanish tekisligiga qarab osonlikcha aniqlanadi.

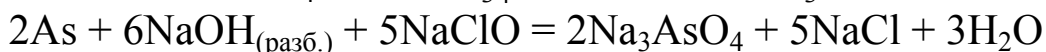
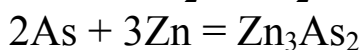
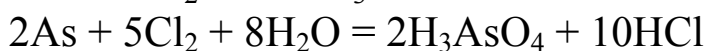
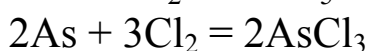
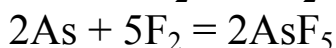
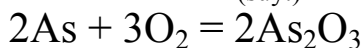
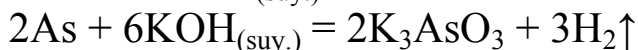
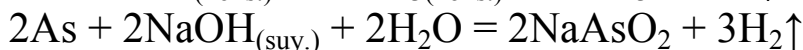
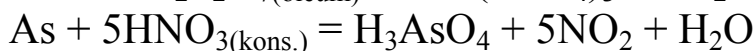
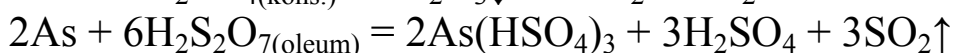
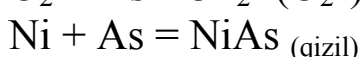
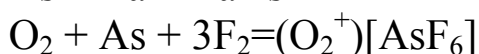
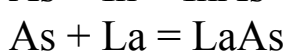
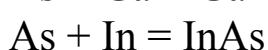
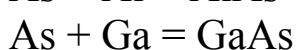
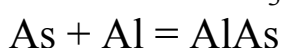
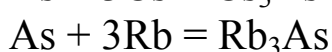
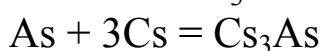
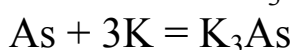
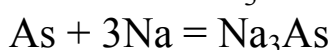
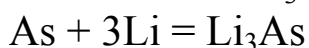
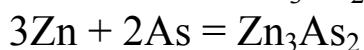
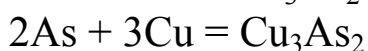
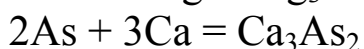
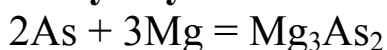
Ishlatilishi. As_2O_3 oynalarning yaltirashini yo‘qotish, charm va mo‘ynalarni konservatsiya qilishda ishlatiladi. Mishyak va uning

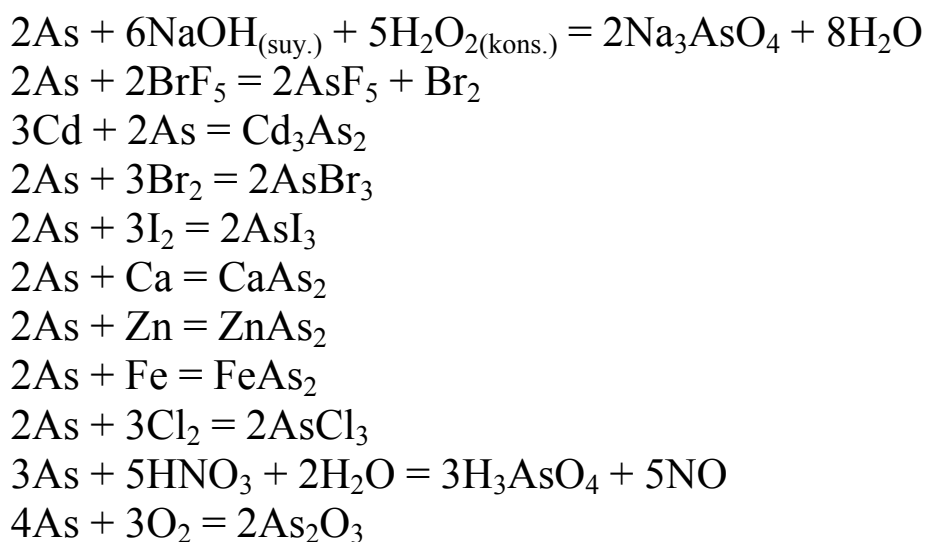
birikmalari juda zaharli. Tibbiyotda tarkibida mishyak boʻlgan preparatlar (novarsenol, osarsol va boshqalar) dan foydalaniladi.

Qotishmalari. Mishyak qotishmalari baʼzan mis va qoʻrgʻoshin qotishmalariga kiritiladi (masalan, pitrat ishlab chiqarishda). Mishyak qotishmalari inert atmosfera vakuum usulida olinadi.

Olinishi. Tabiatda mishyak, asosan, sulfidlar va sudfoarsenidlar tarzida uchraydi; arsenopirit (As kolchedani), realgar va boshqalar shular jumlasidandir. Rudalarni oksidlab qizdirish yoʻli bilan As_2O_3 olinadi, soʻngra pista koʻmir yoki koks bilan mishyakgacha qaytariladi.

Kimyoviy xossalari:





Selen – Se

SELEN: belgisi - Se. 1817-yilda shved kimyogari Y.Berselius tomonidan kashf etilgan, (lot. Selenium, yunoncha “selena”- oy soʻzidan olingan), davriy sistemaning VI guruh kimyoviy elementi, zichligi 4,807 g/cm³; tartib raqami 34, atom massasi 78,96, birikmalari zaharli, bir necha allotropik shakl oʻzgarishlari bor, ular orasida eng maʼlumlari: qizil kukun holidagi amorf selen, uning zichligi 4,26 g/cm³, $t_{\text{suyuuq}}=50^{\circ}\text{C}$; $t_{\text{qayn}}=657^{\circ}\text{C}$; geksagonal kulrang kristallik selen, zichligi 4,80 g/cm³, $t_{\text{suyuuq}}=217^{\circ}\text{C}$, bularning ikkalasi ham suvda erimaydi, H₂SO₄ va KOH da eriydi. Selen yarim oʻtkazgich boʻlib, unga yorugʻlik nuri berilganda, elektr oʻtkazuvchanligi keskin oʻzgaradi. Selenning metallar bilan birikmasi - selenidlar (termoelementlar, fotoqarshiliklar va hokazo) ham yarim oʻtkazgichlar sifatida ishlatiladi. Selen qoʻsh oksidi SeO₂ shishaga yoqut rang beradi.

Minerallari. Selen yer kurrasida 6·10⁻⁵ (ogʻirligi boʻyicha) mavjud. Tabiatda selen doimo oltingugurt bilan birgalikda uchraydi. Mis, rux, qoʻrgʻoshinning sulfidli minerallari tarkibiga kiradi.

Naumannit - Ag₂Se,
 agvilarit - Ag₂(Se,S),
 berselianit - Cu₂Se,
 evkayrit - Cu₂Se·Ag₂Se,
 galenit (selenli) - Pb(S, Se),
 klaustalit - PbSe.

Ishlatilishi. Selendan asosan elektrotexnika sanoatida foydalaniladi. Kristallik selen elektr tokini ozgina oʻtkazadi, yoritilganda elektr oʻtkazish

qobiliyati nihoyatda kuchayadi, shu fazilatidan foydalanib, u fotometr, yorug‘lik signallari va televideniya ishlatiladi.

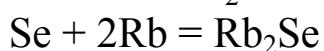
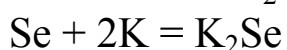
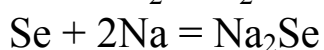
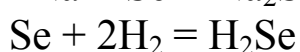
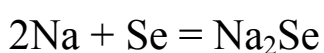
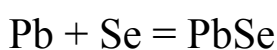
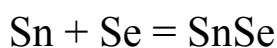
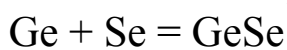
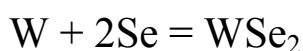
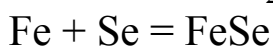
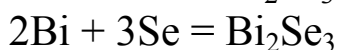
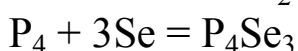
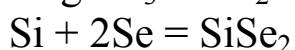
Qotishmalari. 303 markali po‘lat tarkibida 0,15-0,30% selen aralash qotishmasi mavjud. Metallurgiyada po‘latning 18-8 markasining yuqori korroziya va chidamliligini oshirish uchun selen qo‘shilib, sanoatda qotishmasi ishlatiladi.

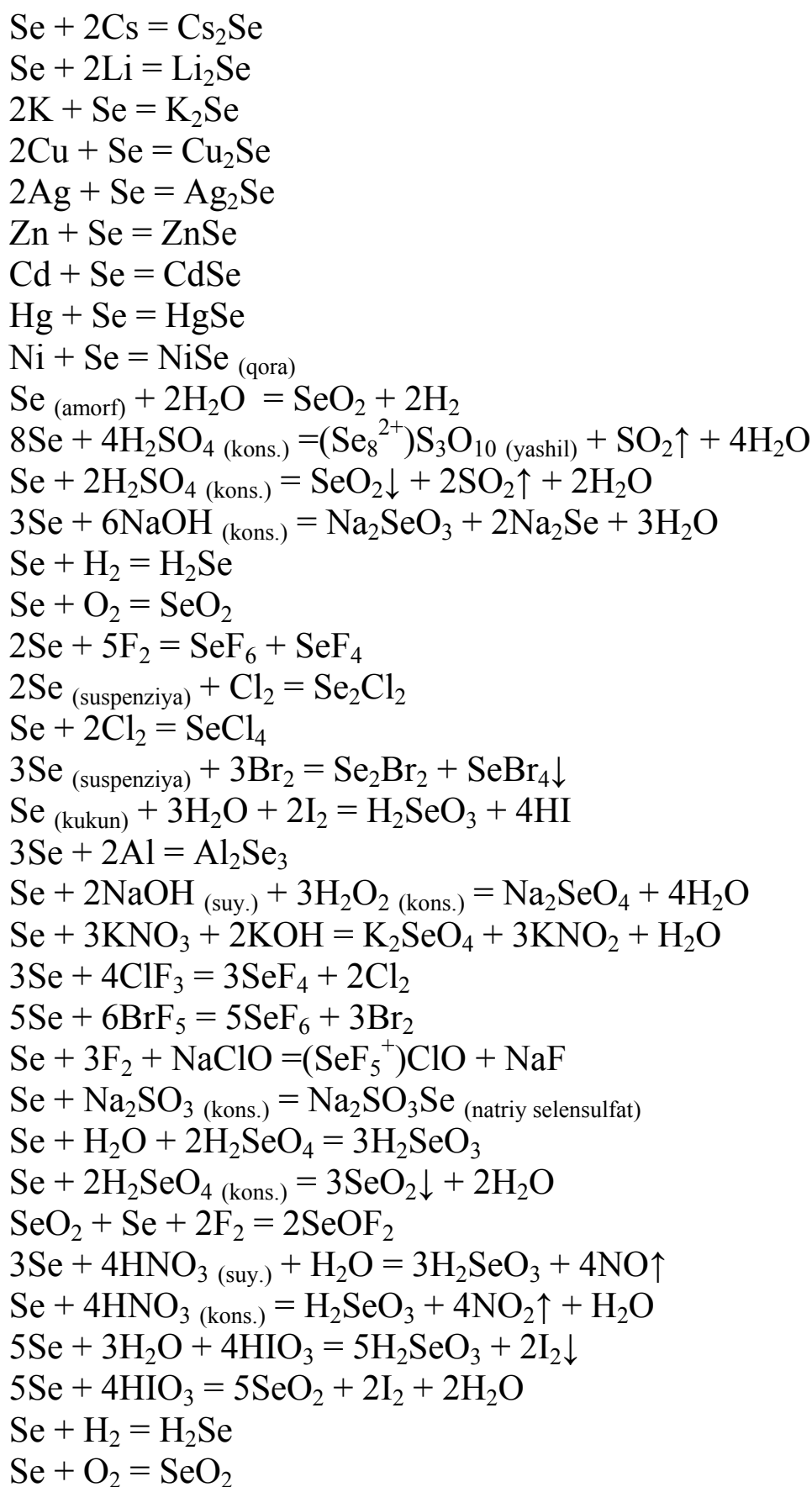
Olinishi. Selen uchun asosiy manba bu mis sanoatidagi anodli shlamdir. Uning tarkibida 2,0% - 16,0% gacha selen bo‘ladi. Shuningdek, selen sulfat kislotasi olish texnologiyasidagi shlamda, selyuloza – qog‘oz sanoatida, qo‘rg‘oshin, rux sanoatidagi shlamlarda ham uchraydi. Uni qayta ishlash paytida selen ishqorli yoki sodali, ba’zida sulfatli yoki xloridli eritma tarkibiga o‘tkaziladi. So‘ng oltingugurt oksidi yordamida

qaytarilib, cho‘ktiriladi. Aluminiyli metall yordamida ishqorli suv eritmasi tarkibidan qaytarilib, sof selen elementi olinadi. U misni elektroliz usuli bilan olishda hosil bo‘ladigan chiqindi cho‘kma (shlam) lardan olinadi. Olmaliq sharoitida anodli misni elektroliz orqali eritmaga o‘tkazib, katodga jipslashib, erigach selen cho‘kmaga mayda qattiq qum zarrachasi holiga o‘tadi, so‘ng alohida qayta ishlanib,

sof selen ajratib olinadi.

kimyoviy xossalari:





Brom - Br

BROM: belgisi - Br (yunoncha «bromos» yomon hidli – qo‘lansa, badbo‘y demakdir) - galogenlar guruhiga mansub, (lot. Bromum), davriy sistemaning VII guruh kimyoviy elementi, tartib raqami 35, atom massasi 79,904. 1826-yilda fransuz kimyogari A.Balaru tomonidan kashf qilingan; Brom o‘tkir, noxush hidli, to‘q qizil tusli, qizg‘ish-kulrang og‘ir suyuqlik; odatdagi haroratda ham bug‘lanib turadi; suvda eriydi (suv ham bromda eriydi); zichligi $3,102 \text{ g/cm}^3$, $t_{\text{suyuq}}=-7,3^{\circ}\text{C}$, $t_{\text{qayn}}=58,8^{\circ}\text{C}$; 100g suvda 0°C da 4,17g, $19,90^{\circ}\text{C}$ da 3,58g brom eriydi. Brom spirtida, efirda, uglerod sulfidida va xloroformda yaxshi eriydi. Zaharli, shilliq pardalarga ta‘sir etadi, terini o‘yadi. Tabiatda brom xlorning doimiy yo‘ldoshi.

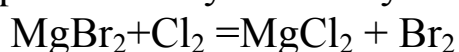
Bromidlar (NaBr, KBr, MgBr) xloridlar (masalan, NaCl) qatlamlarida, dengiz va sho‘r ko‘llar suvida uchraydi.

Minerallari. Tabiatda bromargirit AgBr, embolit Ag(Cl,Br) kabi brom minerallari uchraydi.

Ishlatilishi. Laboratoriyalarda oksidlovchi sifatida va organik sintezlarda ishlatiladi. Brom birikmalari (AgBr) fotografiyada, antidetanatorlar (etilbromid, dibrometan), insektitsidlar (hashoratlarga qarshi kimyoviy oksitlar) va boshqa sifatida qo‘llaniladi. NaBr, KBr, shuningdek, bromning organik hosilalaridan tibbiyotda asabiylik, uyqusizlik kasalliklarini davolashda foydalaniladi.

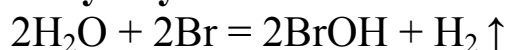
Qotishmalari. Brom tarkibli metallar birikmasi mavjud bo‘lib, ular dibrometan pretroidlar holida uchraydi.

Olinishi. Sanoat miqyosida brom asosan tabiiy suvlardan olinadi. Sof holdagi bromni olish uchun uni o‘z tuzlari tarkibidan xlor bilan siqib chiqarish reaksiyasidan foydalaniladi.



Ushbu kimyoviy reaksiyadan ma‘lumki, tabiiy suv tarkibidagi brom osonlikcha kimyoviy usul bilan olinadi.

kimyoviy xossalari:



Rubidiy - Rb

RUBIDIY: belgisi - Rb. 1861-yilda nemis olimlari R. Bunzen va G. Kirxgof tomonidan spektr analiz orqali kashf etilgan. (lot. rubidius - qizil, to‘q qizil (spektrning qizil sohasidan aniqlangan) ishqoriy metallar guruhiga kiruvchi kimyoviy element, davriy sistemaning I guruh elementi, tartib raqami 37, atom massasi 85,47, zichligi $1,532 \text{ g/cm}^3$, $t_{\text{suyuq}}=39,49^{\circ}\text{C}$, $t_{\text{qayn}}=686^{\circ}\text{C}$, kumushday oq kubik kristallik yumshoq metall, uning spektrida qizil chiziqlar bor. Rubidiy oson suyuqlanuvchan qovushqoq kumush rang - oq metall; U alangani pushtiga bo‘yaydi, havoda nihoyatda oson oksidlanadi, suvda va spirtida eriydi, suvni ajratadi. Kimyoviy jihatdan juda faol metallardan biri.

Minerallari. Uran rudalari tarkibida uchraydi. Tabiatda ancha keng tarqalgan, lekin tarqoq holda, asosan, uning minerallari kaliy yoki litiy bilan birgalikda uchraydi.

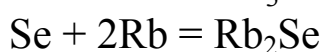
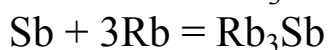
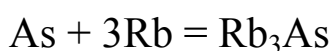
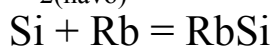
Ishlatilishi. Rubidiy fotoelementlar, kunduzgi yorug‘lik lampalarida, vakuum texnikasida qo‘llaniladi. Seziy kabi ionli raketa dvigatellari uchun istiqbolli yoqilg‘ihisoblanadi. Rubidiy yarim o‘tkazgichli texnikada pezo element kristallarini hosil qilishda va maxsus qotishmalar tayyorlashda ishlatiladi. Rubidiy bromid va yodid tibbiyotda keng qo‘llaniladi.

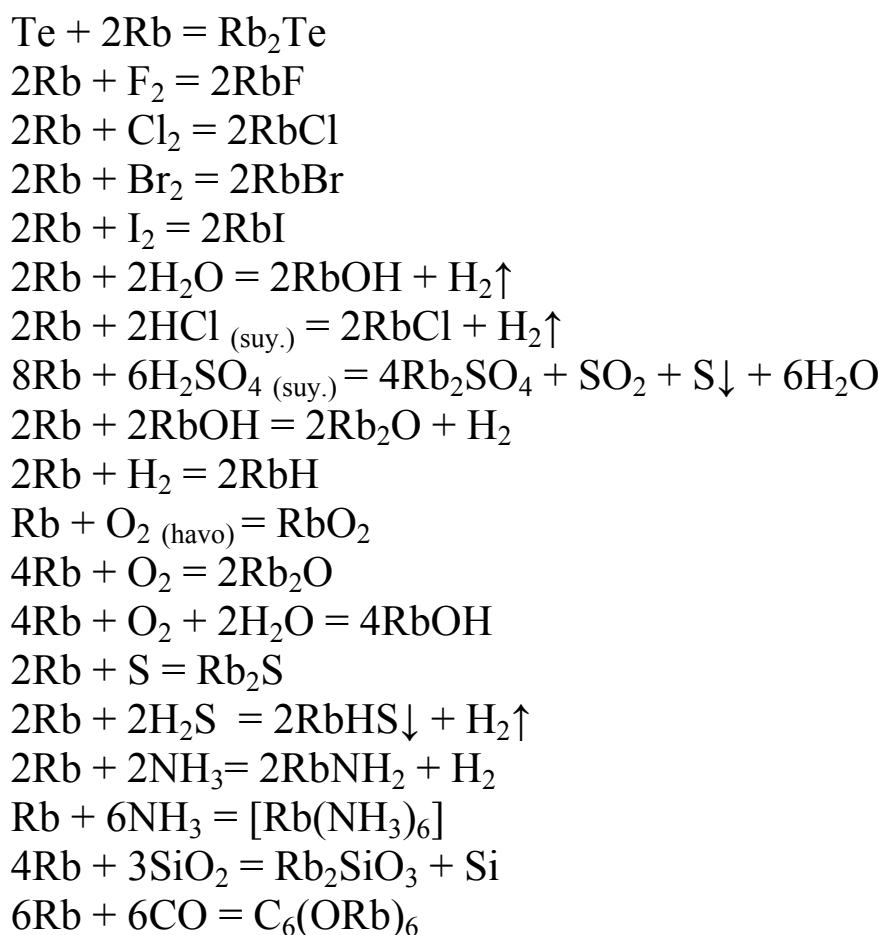
Qotishmalari. Rubidiy geksakobaltat, rubidiy polusulfid, rubidiy ozonid, rubidiy oksid.

Olinishi. Ushbu kimyoviy element juda faol hisoblanib, hatto xona haroratida ham havo bilan alanganishi, kislorod bilan esa nihoyatda tez alanganishi mumkin. 1960–1970-yillarda jahonda bor yo‘g‘i 50-60 kg sof va birikma holida olingan edi. Hozir bu ko‘rsatkich 5-6 barobarga oshgan bo‘lsa ajab emas. Shuning uchun ham olish texnologiyasi murakkab. Toza metall holida rubidiy olish uchun rubidiy xlorid metall holidagi kalsiy bilan qaytariladi. Ba’zida karbonat rubidiy amotermik usul bilan qaytariladi. O‘ta sof holda olish uchun qo‘shimcha nokerak

vakuumda fraksiyali distillyatsiya usuli bilan bug‘lantiriladi. Olingan rubidiy zarrachasi asosan kerosinda saqlanadi.

Kimyoviy xossalari:





Stronsiy - Sr

STRONSIY:belgisi - Sr. Stronsiy metalini 1808- yilda ingliz kimyogari G.Devi elektroliz usuli bilan ajratib olgan. Element

Shotlandiyaning Stronsian qishlog'iyaqinida topilgan stronsianit minerali nomidan olingan.

Davriy sistemaning II guruh elementi, ishqoriy yer metallar guruhiga mansub kimyoviy element (lot. Stronsium), tartib raqami 38, atom massasi 87,62. Stronsiy kumushsimon-oq yumshoq metall, zichligi 2,630 g/sm³; selestin va stronsianit mineralidan olinadi.

Stronsiyning yadro sinashlarida hosil bo'ladigan radioaktiv izotopi ⁸⁹Sr va ayniqsa, ⁹⁰Sr juda zaharli, t_{suyuq}=770⁰C, t_{qayn}=1380⁰C; och sariq faol metall, suvni ajratadi, uchuvchan birikmalarining bug'ialangani qizartiradi.

Minerallari. 1792-yilda stronsianit minerali tarkibidan kashf qilingan; stronsianit - SrCO₃, Selestin - SrSO₄.

Ishlatilishi. Stronsiy mis va bronzani oksidsizlantirishda, elektrvakuum texnikasida gazlarni yutuvchi sifatida ishlatiladi; uning tuzlari yorituvchi tarkiblar tayyorlashda, glazur va emallar ishlab

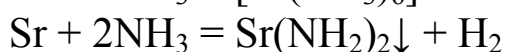
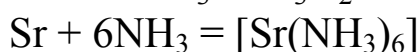
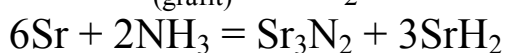
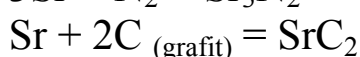
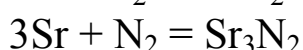
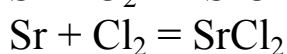
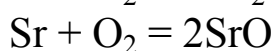
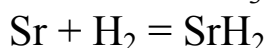
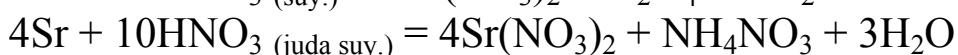
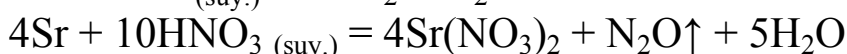
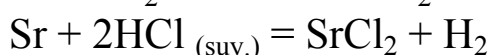
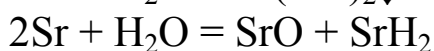
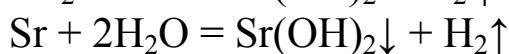
chiqarishda ishlatiladi. Shuningdek, u yadro sinashlarda ham ishlatiladi. Uning eng radioaktiv izotoplari ishlatiladi, biroq sinov paytida uning radioaktiv izotopi (89,90) juda zaharlidir.

Qotishmalari. Stronsiy, uglerod, temirlar bilan qotishma hosil qiladi.

Olinishi. Stronsiy tarkibli minerallarni qayta ishlash jarayonida Sr erkin holda ajratib olinadi. Shuningdek, stronsiy o‘zining xloridli tuzlarini elektroliz qilish orqali ham olinadi. Toza stronsiy SrO stronsiy (II) oksidni alamoteriya usuli bilan olinadi, ya’ni

$3\text{SrO} + 2\text{Al} \rightarrow \text{Al}_2\text{O}_3 + 3\text{Sr}$ reaksiya yuqori haroratda olib boriladi.

Kimyoviy xossalari:



Ittriy - Y

ITTRIY:belgisi Y. 1974-yilda fin kimyogari Yu.Gadolin ittribit mineralidan noma’lum metall oksidli yangi “tuproq” ni aniqlaydi va uni ittriyli deb, metallni - ittriy deb ataydi. [Shvetsiyadagi Itterbyu qishlog‘inomidan], (lot. Ytrium), davriy sistemaning III guruh kimyoviy elementi, tartib raqami 39, atom massasi 88. Ittriy kumush rang oq metall; zichligi $4,480 \text{ g/sm}^3$, $t_{\text{suyuq}}=1528^0\text{C}$; $t_{\text{qayn}}=3320^0\text{C}$.

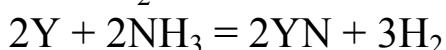
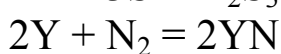
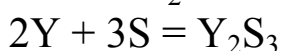
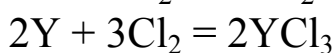
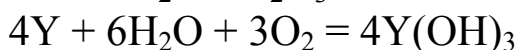
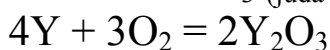
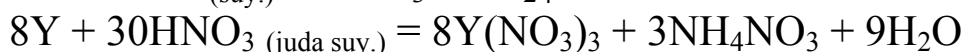
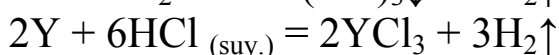
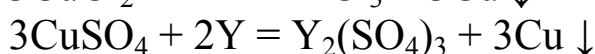
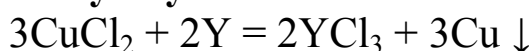
Minerallari. Ittriy, skandiy, lantan va lantanoidlar tabiatda birgalikda uchraydigan nodir yer elementlari guruhini tashkil etadi. Ittrotserit-(Ca,Y,Ge)F2-3, ittroyflyorit -(Ca,Y) F2-3, ittrokalsit - (Ca, Y) F2-3, (2-3 valentli birikmalar).

Ishlatilishi. Qotishmalarni legirlash va tozalashda Y_2O_3 oksid ko‘rinishdagisi ishlatiladi, sanoatda esa rangli lyuminoforlar, maxsus optik shishalar, katalizatorlar, o‘tga chidamli buyumlar, temir-itterli va Aluminiy-itterli yoqutlar, oksidli katodlar olinadi. Shuningdek, Aluminiy, magniy, xrom va titan qotishmalariga qo‘shilib, maxsus qotishma tayyorlanadi. Ittriyl maxsus qotishmalar yadro reaktori uchun konstruksion material sifatida keng qo‘llaniladi.

Qotishmalari. Ittriy asosida quyidagi qotishmalar mavjud: Mg, Al, Ce, Cu, Ti, V, Cr, Te.

Olinishi. 1828-yilda nemis olimi F. Vyoler metall holda ittriyni (tarkibida ko‘p qo‘shimchalar bo‘lgan holda) ajratib oladi. Ittriy tarkibi noyob metallarga judayam yaqinligi sababli, kimyoviy tarkibi ham noyob metallar kabi deb qaraladi. Shuningdek, ittriyni rudalardan ajratib olish texnologik jarayonlari ko‘p mehnat talab qiladigan ishdir. Bunda rudani boyitish orqali mahsulotlar Y_2O_3 hosil qilish va unga magniy bilan yuqori metallotermik qaytarish orqali olinadi.

Kimyoviy xossalari:



Sirkoniy - Zr

SIRKONIY:belgisi - Zr. 1789-yili nemis kimyogari Klaprot tomonidan kashf etilgan bo‘lib, sirkon minerali tarkibidan dioksid sirkoniy ajratib olindi. Zr (yunoncha Zirconium forscha “zargun”- oltin tosh so‘zidan olingan), davriy sistemaning IV guruh elementi, tartib raqami 40, atom massasi 91,22. Sirkoniy kumushrang oq metall, qattiq, qiyin eriydigan, korroziyaga chidamli metall; zichligi $6,45 \text{ g/sm}^3$; $t_{suyuq} =$

1855⁰C, $t_{\text{qayn}}=3600^0\text{C}$. Oradan 136 yil o'tgach, 1925-yilda sirkoniy iodidini termik parchalash orqali toza sirkoniy olindi. Yer qobig'ida ancha ko'p bo'lib, massa bo'yicha 0,025% ni tashkil etadi. Demak, u yer qobig'ida joylashishi bo'yicha xalq xo'jaligida keng qo'llanilib kelinayotgan mis, rux, qalay, nikel va qo'rg'oshindan ham oldinda turadi. Chet elda yiliga o'rtacha 1 mln. dan ortiq sirkoniyli boyitma ishlab chiqariladi.

Minerallari. Sirkoniyning 20 ga yaqin minerallari bo'lib, sanoatda 2 ta minerali keng qo'llaniladi. Sirkon va baddeleit ZrO_2 minerallari sirkoniyning asosiy manbaidir. Baddeleit - toza sirkoniy dioksidi bo'lib, tarkibida 98% gacha ZrO_2 bo'ladi. Uning tarkibida qisman gafniy, uran va toriy bo'lishi mumkin, zichligi 5,5-6 g/sm^3 . Makoni Braziliyada keng tarqalgan. Sirkon - sirkoniy ortosilikati ZrSiO_4 (67,2 % ZrO_2 , 32,8 SiO_2) jigarrangli mineral bo'lib, zichligi 4,4-4,7 g/sm^3 , qattiqligi esa mineralogik shkala bo'yicha 7,5. Uning yirik konlari Avstraliya, Braziliya, Hindiston, JAR, AQSH, Rossiyaning Ural tog'lari va Ukrainada joylashgan.

Ishlatilishi. Sirkoniy toza holda atom energetikasida keng qo'llaniladi. Elektrotexnikada esa gazlarning yutilishini ta'minlash uchun hamda elektron asbobida yuqori vakuumni saqlashda ishlatiladi. Sirkoniy kukuni yuqori tezlikda yonishi va past haroratda alanga olishi uchun, harbiy mudofaada o'q-dori olish va portlovchi modda tayyorlashda ishlatiladi. Shuningdek, u o'tga chidamli, olovbardosh mahsulotlar olishda, chiroyli, nozik farfor idishlar va oyna olishda asosiy xomashyo sifatida qo'llanilmoqda. Gafniydan tozalangan sirkoniy yadro energetikasida konstruksionmaterial sifatida ishlatiladi ("neytron shaffoflik" deb atalib, neytronlarni oson o'tkazadi); po'latning mexanik xossalarni oshirish uchun unga kiritiladi; o'tga chidamli materiallar, keramika, shishaning aloqida navlarini tayyorlashda sirkon va baddeleit keng ishlatiladi.

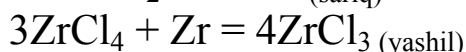
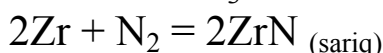
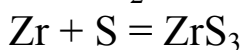
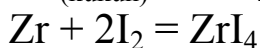
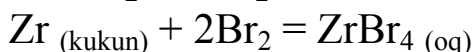
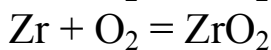
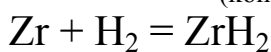
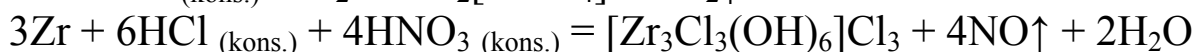
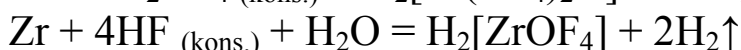
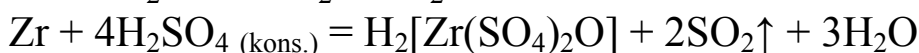
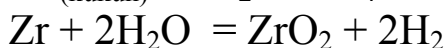
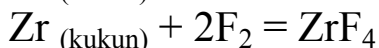
Qotishmalari - sirkoniy asosidagi qo'rg'oshin, temir, xrom, nikel va boshqa elementlar qotishmalari. Issiqlik neytronlarini kam ushlab qolishi, 5000-6000C da yetarli mustahkamlikka egaligi, yuqori haroratlarda suv, ishqoriy va ba'zi kislotali muhitlarda korroziyaga ancha chidamliligi bilan farq qiladi.

Olinishi. Sirkoniyli rudalar gravitatsion, elektromagnit va elektrostatik separatsiya usullari bilan boyitilib, tarkibida 60-65% dan kam bo'lmagan ZrO_2 li boyitma olinadi. Boyitma kuydirilgach, HCl da tanlab eritiladi, cho'kma sulfat kislotada qayta eritiladi. So'ng u tozalanib, suzib yuqori haroratda toblanadi (600-700⁰C da) va toza 99,8% li ZrO_2 olinadi.

Shuningdek, sirkoniy boyitmalarini 900-1000⁰C da xlorlash pechlarida uglerodli mahsulot aralashmasi yordamida sirkoniy tetroxloridi olinadi.

ZrCl₄ dan magniy yordamida toza sirkoniy kukunini olish mumkin.

kimyoviy xossalari:



Niobiy - Nb

NIOBIY: belgisi - Nb. 1801-yilda ingliz olimi Ch. Gatchett tomonidan kashf etilgan. 1844-yilda nemis kimyogari Roze kolumbit minerali tarkibida 2 ta element borligini va shulardan biri niobiy ekanligini topib, uni niobit deb ataydi. Tantalga o‘xshashligidan shunday nomlangan (Yunon afsonasidagi Tantal qizi Niobiy nomi bilan atalgan), (lot. Niobium), davriy sistemaning V guruh kimyoviy elementi, tartib raqami 41, atom massasi 92,906, och kulrang kubik kristallik metall; zichligi 8,570 g/cm³, t_{suyuq}=2470⁰C, t_{qayn}=4842⁰C, suvda erimaydi, qaynoq H₂SO₄ da eriydi, HNO₃ va HCl da oz eriydi. Toza holda 1907-yil Bolton tomonidan olindi. Niobiy yer qobig‘ida nihoyatda kam - 1·10⁻³ %.

Minerallari. Niobiyning alohida minerallari nihoyatda kam, shuning uchun ham u tantal bilan tabiatda tantalit-kolumbit, piroxlor, loparit minerallari (uning 100 ga yaqin minerallari mavjud) tarkibida uchraydi.

Niobiy olish uchun sanoatda eng keng qo‘llaniladigan mineral bu piroxlordir. Uning tarkibida Nb₂O₅ 37-65% gacha bo‘ladi.

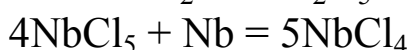
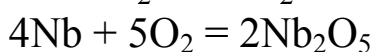
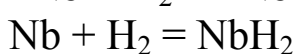
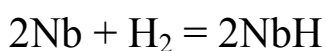
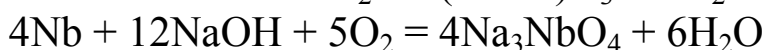
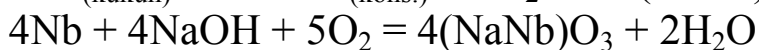
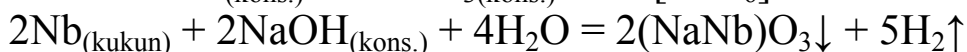
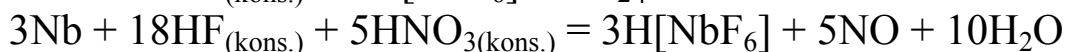
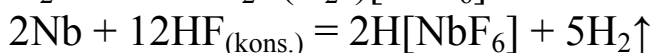
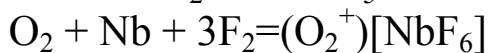
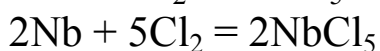
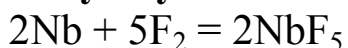
Ishlatilishi. Niobiy po‘lat tayyorlashda keng ishlatiladi. Niobiyning temirli qotishmasi (ferroniobiy) maxsus po‘latlar tarkibiga kiritilgan va

ulardan kimyoviy va neft haydash apparatlari, reaktiv dvigatel, raketa, gaz turbinalari va boshqa detallar tayyorlanadi. Atom sanoatida niobiyning sirkoniy bilan qotishmasidan issiqlik ajratuvchi elementlarning qobiqlari va energiya ishlab chiqaradigan yadro reaktorlarining boshqa elementlari tayyorlanadi. Niobiy maksimal kritik haroratlarga ega bo'lgan o'ta o'tkazgichlar olishda foydalaniladigan materiallarning asosiysi hisoblanadi. Radioelektronikada ham ishlatiladi.

Qotishmalari – niobiya molibden, volfram, sirkoniy, titan, vanadiy va boshqa elementlar qo'shib olingan qotishmalar. Issiqbardoshligi yuqori, yetarlicha texnologik ishlanadi, agressiv muhitlar va suyuq metallar korroziyalari ta'siriga chidamli. Niobiy qotishmalari o'ta elektr o'tkazuvchan. Niobiy qotishmalarining olovbardoshligi past bo'lib, yuqori haroratlarda uzoq muddat ishlashi uchun unga himoya qoplamasi kerak. Yadro energetikasida, kimyo sanoatida, raketa detallarini tayyorlashda ishlatiladi.

Olinishi. Niobiy olish uchun niobiy, tantalli konsentratlarga murakkab kimyoviy ishlov beriladi va Nb_2O_5 oksidi yoki Nb ning kompleks ftoridi hosil qilinadi, so'ngra ularni metallotermik qaytarish yo'li bilan niobiy kukunlari olinadi. Niobiy ko'pgina issiqbardosh va korroziyabardosh qotishmalarning asosiy komponenti hisoblanadi. Eng asosiy qiyin kechadigan jarayon – bu tantalni niobiydan ajratish va uni toza holda olishdir. Unda ekstraksiya usuli, so'ng esa xloridlarni rektifikatsiyalash usuli qo'llaniladi. Natriotermik usul bilan niobiy kukuni toza holda olinadi.

kimyoviy xossalari:



Molibden -Mo

MOLIBDEN: belgisi - Mo. 1778-yilda shved kimyogari Sheelle tomonidan kashf etildi. 1782-yilda shved kimyogari

P.Gelm molibden (III) oksidini (Mo_2O_3) uglerod yordamida qaytarish natijasida toza holda molibden oldi. Molibden davriy sistemaning VI guruh kimyoviy elementi, tartib raqami 42, atom massasi 95,94 kumushsimon-kulrang qiyin eriydigan metall; zichligi $10,2 \text{ g/sm}^3$; $t_{\text{suyuq}}=2620^\circ\text{C}$, $t_{\text{qayn}}=4630^\circ\text{C}$, ba'zi po'latlar tarkibiga kiradi, kislotalarda eriydi. U kamtarqalgan element bo'lib, yer qobig'ida o'rtacha massa bo'yicha $3 \cdot 10^{-4}$ joylashgan. Asosiy ishlab chiqaruvchilar AQSH (60%), Chili (20%), Kanada (10 %) va boshqa mamlakatlar yiliga o'rtacha 100 ming tonnadan ortiq metall hisobidan molibden boyitmasi ishlab chiqaradi.

Molibdenlash – po'lat, titan, niobiy va boshqa metall materiallaridan tayyorlangan buyumlar sirtida molibden qoplamasi hosil qilish. Molibden buyumlar qattiqligi, sirt mustahkamligi, azot kislotasiga korroziyabardoshligini oshiradi, qo'shimcha silitsiylanganda esa yuqori haroratlarda olovbardoshligi oshadi. Molibdenlash diffuzion metallash usuli bilan bajariladi. Molibden minerallaridan eng muhimi molibdenit MoS_2 gacha oksidlab qizdiriladi, so'ng tozalab, metall hosil bo'lgunicha vodorod bilan qaytariladi.

Minerallari. Molibdenning 20 ga yaqin minerallari mavjud bo'lib, asosan, 4 ta minerali sanoatda ishlatiladi va tabiatda keng tarqalgan.

Molibdenit MoS_2 . Mineralning nomi grekcha “molibdos”- qo'rg'oshin degan so'zdan kelib chiqqan. Sinonimi: molibden yaltirog'i. Kimyoviy tarkibi Mo 60%, S 40%. Kimyoviy tahlillarning ko'rsatishicha, Mo 57,1-60,05% va S 39,7-42% atrofida bo'ladi. Ko'p hollarda kimyoviy toza birikma bo'lib topiladi, ya'ni tarkibida reniydan boshqa izomorf aralashmalar bo'lmaydi. Spektral tahlillarning ko'satishicha reniy molibdenit tarkibida boshqa sulfidlar tarkibidagiga ($5 \cdot 10^{-7}$ dan $2 \cdot 10^{-4}$, 4 % gacha) qaraganda ko'proq bo'ladi. Molibdenit eng keng tarqalgan mineral bo'lib, yumshoq, kulrang, qo'rqoshinsimon mineral, zichligi $4,7 - 4,8 \text{ g/sm}^3$, Molibdenitning rangi qo'rg'oshindek kulrang. Chizig'ikulrang bo'lib, yashilroq tovlanib turadi. U metalldek yaltiraydi. Qattiqligi 1. Yupqa varaqchalari egiluvchan. Qo'lga yog'langandek unnaydi. Qog'ozga grafitga o'xshab chizadi. Ulanish tekisligi {0001} bo'yicha o'ta mukammal. Solishtirma og'irligi 4,7-5,0. Molibdenit elektr

o'tkazuvchanligi oddiy uy haroratida juda past, lekin harorat orta borishi bilan ko'tariladi.

Diagnostik belgilari. Molibdenit qo'rg'oshindek kulrangligi, tipik metall kabi yaltirashi, qattiq emasligi, asosi bo'yicha ulanish tekisligining borligi xarakterlidir.

Vulfenit – $PbMoO_4$. Kimyoviy tarkibi Pb 61,4%, MoO_3 38,6%.

Ba'zan CaO , CuO , MgO , WO_3 , kamdan-kam CuO_3 va V_2O_5 aralashmalari bor. Singoniyasi tetragonal; simmetriya ko'rinishi piramidal *L*. Kristallarining qiyofasi ko'pincha kvadrat tabletkalar shaklida bo'lib, ba'zan yassi va cho'ziq piramidalaridan iborat kombinatsiya bo'lib topiladi. Yaxlit kristallangan agregatlari birmuncha kam uchraydi. Vulfenitning rangi mumdek yoki asaldek sariq, kulrang, qo'ng'ir, ba'zan sarg'ish-qizil va hattoki qizil. Chizig'ioq yoki juda rangsiz. Qattiqligi 3. Ulanish tekisligi

{111} bo'yicha aniq. Solishtirma og'rliqi 6,3-7,0. Vulfenit ko'proq oksidlangan qo'rqoshinli makonlarda uchraydi.

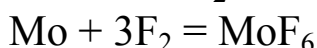
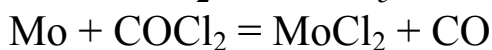
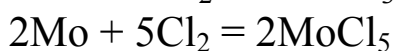
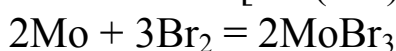
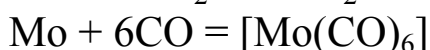
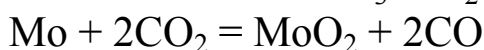
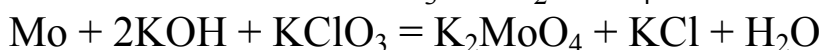
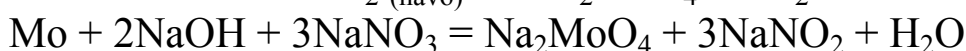
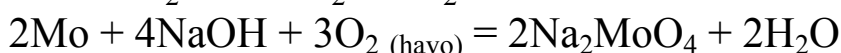
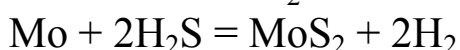
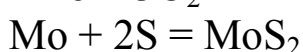
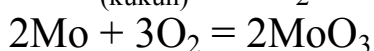
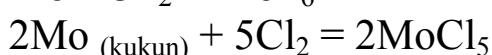
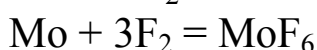
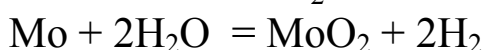
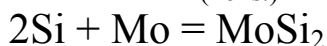
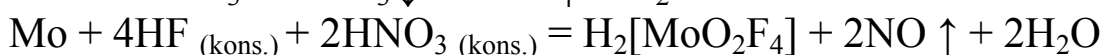
Diagnostik belgilari. Odatda, vulfenitning asaldek sariq rangi, kristallarining tabletkasimon qiyofasi, olmos kabi yaltirashi, katta solishtirma og'rlikka ega bo'lishi va oksidlanish zonasida boshqa qo'rg'oshin minerallari bilan bir paragenizisda topilishi xarakterlidir. MDH mamlakatlarida molibdenli konlar Shimoliy Kavkaz, Kavkaz - orti, Qozog'iston, Krasnoyarsk o'lkalari va O'zbekistonda mavjud bo'lib, ruda tarkibida 0,05 - 2 % gacha molibden bo'ladi.

Ishlatilishi. Molibden 75-80% po'latni legirlashda (mustahkamligi va qattiqligini oshirish uchun) ishlatiladi. Molibden issiqbardosh va olovbardosh qotishmalar (masalan, reaktiv dvigatellar ishlab chiqarishda), kislotaga chidamli qotishmalar (kimyo sanoatida ishlatiladigan apparatlar) yaratishda keng qo'llaniladi. Molibden elektr yoritish vakuum asboblar uchun muhim materialdir. Disulfid MoS_2 qattiq moy bo'lib, podshipniklar va mashinalarning ishqalanuvchi metall qismlari yadro reaktorlarida issiqlik ajratuvchi element bo'lib xizmat qiladi. U sim, list va boshqa hollarda elektr lampa, radioelektronika va rentgenotexnikada turli katod va generator lampalarning anodi, elektr lampalarning ichki o'rama simi holida keng ishlatiladi.

Qotishmalari - volfram, reniy, sirkoniy, titan, niobiy, uglerod va boshqa elementlar qo'shilgan molibden asosidagi qotishmalar. Konstruksion, issiqbardosh molibden qotishmalari ichida molibdenning titan (0,5%), sirkoniy (0,08%) va uglerod (0,02%) qo'shilgan qotishmasi mashhur. Molibden qotishmalaridan tayyorlangan detallar vakuumda

Olinishi. Molibdenli rudalar 1800⁰C gacha haroratda uzoq vaqt, himoya qoplama bilan havoda 12000-2000⁰C da ma'lum vaqt ishlashi mumkin. Molibden qotishmalari raketa va boshqa uchish apparatlarining muhim detallarini ishlab chiqarishda, yadro energetikasi, elektronika va texnikaning boshqa sohalarida ishlatiladi. Molibden qotishmalarining asosiy afzalligi–issiqbardoshligi va plastikligi pastligidir. Elektr energetikasida rubilnik, avtomat o'chirgichlar, payvandlash uchun elektrodlar, texnikada esa bolg'a, bolta va boshqa mashinasozlikdagi asbob-uskunalarga qattiqligini oshirish uchun qo'shib ishlatiladi. flotatsiya usuli bilan boyitilib, tarkibida 45-55% molibdenli boyitma olinadi. U avvaliga kuydirish pechlarida 500-600⁰C da kuydirilib, molibden sulfidi MoO₃ ga aylantiriladi, so'ng ammiak eritmasi bilan tanlab eritiladi. Tozalangan eritma HCl bilan qayta ishlanib, kristallanadi. Hosil bo'lgan paramolibdat ammoniy termik parchalanadi. 90-100⁰C da boshlangan jarayon 280-380⁰C da MoO₃ olish bilan yakunlanadi. Uch oksidli molibden tayyor mahsulot bo'lib, qora metallurgiyada keng qo'llaniladi. Toza holda molibden kukunini olish uchun u vodorod bilan uch bosqichda 620-900⁰C da qaytariladi.

kimyoviy xossalari:



Texnetsiy – Tc

TEXNETSIY: belgisi – Tc. Sun'iy olingan radioaktiv kimyoviy element; (yunon. technetos – sun'iy), (lot. technetium), davriy sistemaning VII guruh elementi, tartib raqami 43, atom massasi [99]. Kumushsimon - jigarrangli qiyin eruvchi metall, zichligi $11,48 \text{ g/cm}^3$, $t_{\text{suyuq}}=2200^{\circ}\text{C}$, $t_{\text{qayn}}=4600^{\circ}\text{C}$; γ - nurlanish yo'qligi tufayli ^{99}Tc radiometriya va dozimetriyada standart hisoblanadi.

Minerallari. Texnetsiy sun'iy radioaktiv kimyoviy element bo'lganligi uchun ham minerallari tabiatda uchramaydi. Uranning parchalanishi natijasida texnetsiy hosil bo'ladi.

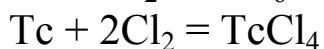
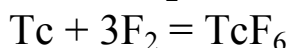
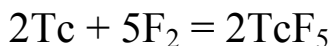
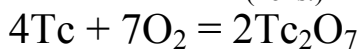
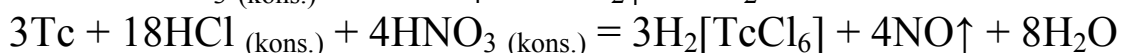
Ishlatilishi. Texnetsiy birikmalari – pertexnatlar, masalan, reaktorlarning o'ta muhim detallarini zanglatishdan saqlashda qo'llaniladi.

Shuningdek, zanglmaydigan ayrim qotishmalar ham tayyorlanadi.

Qotishmalari. Texnetsiy yadro reaktoridagi birikmalarda hosil bo'ladi.

Olinishi. Uran yadrosining parchalanishida texnetsiy nisbatan katta miqdorda paydo bo'ladi; chunonchi, u yadro reaktorlarining nurlangan issiqlik ajratuvchi elementlarining qayta ishlash mahsulotlarida yig'iladi. Shuningdek, texnetsiy tabiatda uchramaydi, yadro reaksiyalari orqali sun'iy ravishda olinadi. Texnetsiy olish uchun manba sifatida atom sanoatining chiqindisi – ularning yemirilishi natijasida hosil bo'ladigan mahsulotlardan foydalaniladi. Uning barqaror izotopi ^{99}Tc .

kimyoviy xossalari:



Ruteniy - Ru

RUTENIY: belgisi – Ru. Rus kimyogari, Qozon universitetining olimi K.Klaus 1844-yilda kashf etgan va Rossiya sharafiga ruteniy deb atagan, (lot. Ruthenio), davriy sistemaning VIII guruh kimyoviy elementi, platina guruhidagi metallar turkumiga mansub, tartib raqami 44, atom

massasi 101,07. Kulrang-kumushday oq metall; zichligi 12,4 g/sm³, t_{suyuq}=2250⁰C, t_{qayn}=4077⁰C. Tabiatda platina guruhidagi metallar bilan birga uchraydi. Kislotalarda va zar suvida erimaydi, suyuqlangan ishqorlarda eriydi; qora amorf ruteniy ham bor.

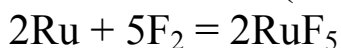
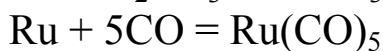
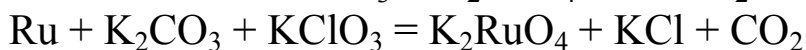
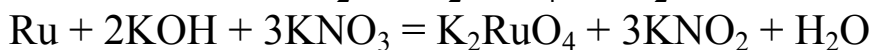
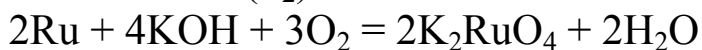
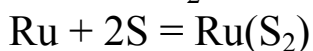
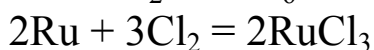
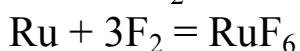
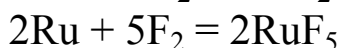
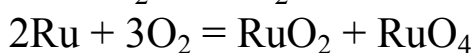
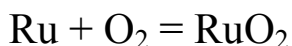
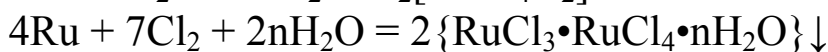
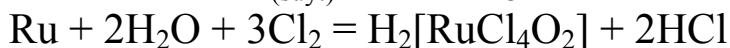
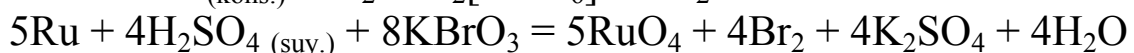
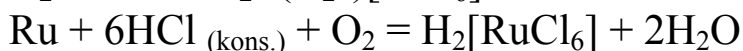
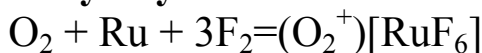
Minerallari. Tabiatda mineral holda bo‘lib, ular siserskit (Os, Ir, Ru), nevyanskit (Ir, Os, Ru) va boshqalar.

Ishlatilishi. Kimyoviy jihatdan juda turg‘un. Ulardan pero, zargarlik buyumlari, laboratoriya idishlari tayyorlanadi. Ruteniy ko‘pgina kimyoviy reaksiyalarda katalizator sifatida ishlatiladi.

Qotishmalari. Ruteniy qotishmalari qattiqligi va yeyilishga chidamliligi bilan ajralib turadi. Shuningdek, nodir platina guruhi metallari qatorida turli qotishmalar va himoya birikmalaridan tashkil topadi.

Olinishi. Ruteniy o‘tkir hidli, oltindek sariq, nihoyatda zaharli, uchuvchi kristall modda. Ruteniyni olishda ruteniy (VIII) oksidi qizdirilganda ruteniy (IV) oksidiga aylanadi. So‘ngra koks ishtirokida qaytarilish reaksiyasi olib borilib, sof ruteniy olinadi.

kimyoviy xossalari:



Rodiy - Rh

RODIY: belgisi - Rh. 1803-yilda kashf qilingan, platina guruhidagi metallar turkumiga kiradigan kimyoviy element (lot. rhodium), (ronok. rhodon – atirgul demak; elementning tuzlari eritmasi pushti – qizil rangli bo‘ladi), davriy sistemaning VIII guruh kimyoviy elementi, tartib raqami 45, atom massasi 102,9055, $t_{\text{suyuq}} = 1966^{\circ}\text{C}$, $t_{\text{qayn}} = 3627^{\circ}\text{C}$, zichligi $12,44 \text{ g/cm}^3$. Rodiy - kumushsimon-oq zangori kubik kristallik rangli, qattiq, qiyin suyuqlanuvchan metall; kimyoviy jihatdan juda sust. Tabiatda platina va boshqa platinasimon metallar bilan birga uchraydi. Rodiy platina affinajining chala mahsulotlaridan olinadi. Kislotalarda deyarli erimaydi, zar suvida ham erimaydi.

Minerallari. Rodiy minerallari izomorf aralashma holda mis, nikel, sulfidli rudalarda uchraydi. Rodiy (II) - sulfid (rodiy monosulfid) RhS , to‘q kulrang barqaror modda. Rodiy (III) - gidroksid $\text{Rh}(\text{OH})_3$ sariq kukun.

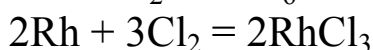
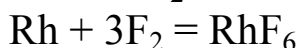
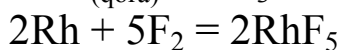
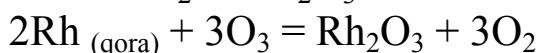
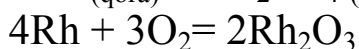
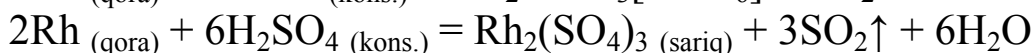
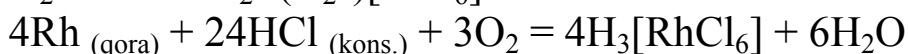
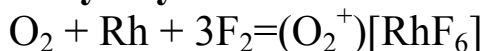
Rodiy (III)oksid Rh_2O_3 , kulrang kristallik modda, 1000°C dan yuqorida ajraladi.

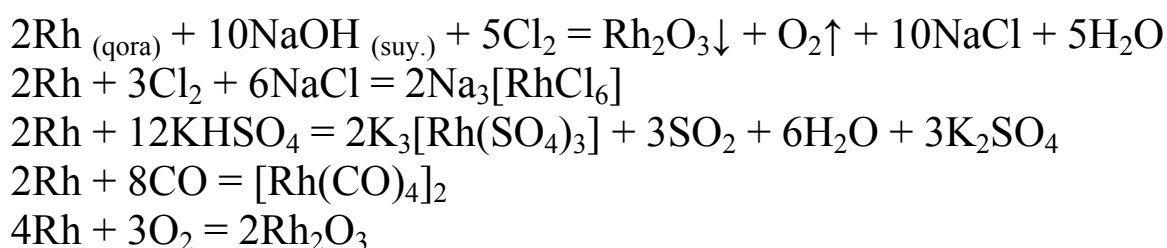
Ishlatilishi. Rodiy galvanik qoplamalarda, platinali qotishma holda (masalan, katalizatorlar, termoparalar, kimyoviy idish va boshqalarda) ishlatiladi.

Qotishmalari. Rodiyning platina bilan lazer nurlari ta’sirida qotishmasi hosil bo‘ladi.

Olinishi. Sulfidli birikmalarni qayta ishlash texnologiyasi orqali erkin rodiy hosil qilinadi. Shuningdek, rodiy platina guruhidagi element bo‘lib, ruda tarkibida juda kam miqdorda uchraydi. Rodiyni olishda ruda bekorchi jinlardan yuvib tozalanadi. So‘ngra xom rodiyli aralashmaga zar suvi bilan ishlov beriladi. Hosil bo‘lgan kompleks tuzi tarkibidagi rodiyni kislotali eritmada suv tagiga cho‘ktiriladi va sof holda ajratib olinadi.

kimyoviy xossalari:





Palladiy - Pd

PALLADIY:belgisi - Pd. 1803-yilda topilgan va 1802-yilda topilgan kichik planeta Palladiy nomi bilan atalgan. Platina guruhidagi metallarga oid kimyoviy element (lot. Paladium), tartib raqami 46, atom massasi 106,4. Palladiy – kumushrang - oq metall, yumshoq va bolg‘alanuvchan; zichligi 12,02 g/cm³, t^{suyuq}=1554⁰C, t_{qayn}=2877⁰C.

Tabiatda boshqa platina guruhidagi metallar bilan birga uchraydi. Asosan, sulfidli mis - nikel rudalaridan platina bilan birgalikda qazib olinadi. Chet el mamlakatlarida o‘rtacha yiliga 30-35 tonna palladiy ishlab chiqariladi (1995-yilgi ma’lumot).

Palladiylash – metall buyumlarni korroziyadan saqlash yoki sirtlari nurni yaxshi qaytara oladigan qilish uchun ularni galvanik usulda palladiy bilan qoplash.

Minerallari. Palladiy minerallari radioaktiv mineral rudalarda uchraydi: porpetsit - (Au, Pb), stibopalladinit - Pd₃Sb, stannopalladinit - Pd₃Sn₂, potarit - (Pd,Hg).

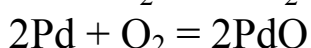
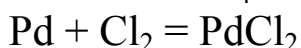
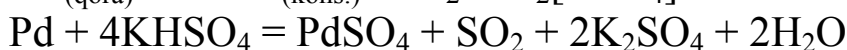
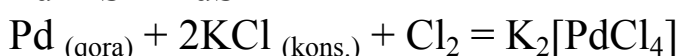
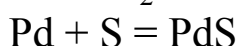
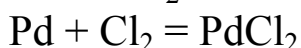
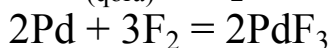
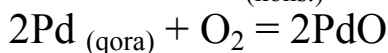
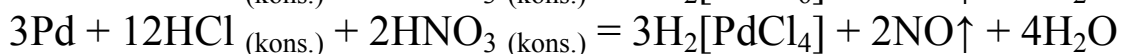
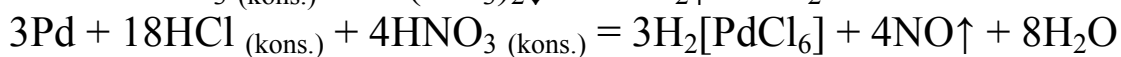
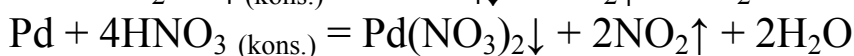
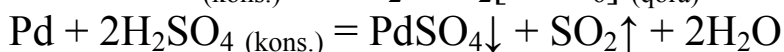
Ishlatilishi. Palladiyning kumushli qotishmasi aloqa apparaturasida keng qo‘llaniladi, oltin, platina, radiyli qotishmalari termorostlagichlarda va termoparalarda, oltin, kumush, nikel va boshqa elementli qotishmalari esa zargarlik hamda tish qo‘yishda (ta‘msiz va qoraymaydi) ishlatiladi. Palladiy va uning birikmalari katalizatorlar sifatida (masalan, gidrogenizatsiyalashda va degidrogenizatsiyalashda) keng foydalaniladi. Toza palladiydan vodorodni tozalashda foydalaniladi. Plastikligi va arzonligi tufayli texnikada boshqa platina guruhidagi metallarga nisbatan ko‘p ishlatiladi. Palladiy katalizator sifatida ham keng qo‘llaniladi. Ayniqsa, vodorodni kisloroddan ajratib olish uchun, tajriba kimyoviy idishlarini tayyorlashda ishlatiladi.

Qotishmasi. Palladiyning quyidagi qotishmalari mavjud: stibopalladinit - (Pd₃Sb), breggit - (Pt, Pd, Ni)₂S.

Olinishi. Nikel va mis sanoatidagi anodli shlamlar zar suvida eritiladi, eritmadan oltin va platina ajratib olingach, palladiyli

birikmaammiakli eritmada cho'ktiriladi, so'ng 800-900⁰C da qizdirilib, ajrati bolinadi. Shuningdek, palladiy tarkibli rudaning bir tonnasida palladiy miqdori o'ndan bir ulushdan ortmaydi. Ruda bekorchi jinslar – qum, loydan yuvib tozalanib, hosil bo'lgan mahsulot 60-90% palladiy va ozroq boshqa metallar aralashmasining tarkibida bo'ladi. So'ngra xom palladiyga zar suvi bilan ishlov beriladi. Noasl metallar eritmaga o'tadi. Olingan N₃[Pd (Cl)₆] kompleks tuz zar suvida yuviladi, suv bilan yuvilib, cho'ktirilib, sof holda olinadi.

kimyoviy xossalari:



Kumush - Ag

KUMUSH: belgisi - Ag. (Argentum - lotincha oq kukun demak), davriy sistemaning I guruh kimyoviy elementi, tartib raqami 47, atom massasi 107,868, yaltiroq oq metall, yaxshi bolg'alanadi; zichligi 10,500 g/cm³, t_{suyuq}=961⁰C, t_{qayn}=2170⁰C; kukun holida qora tusli, kristallari kubik sistemali; HNO₃, qaynoq H₂SO₄, KCN va NaCN eritmalarida eriydi. Elektr va issiq o'tkazuvchanligi katta; havoda o'zgarmaydi. Tabiatda tug'ma va birikmalar (kumush yaltiroqi Ag₂S, xlorargirit AgCl) holida uchraydi, lekin ikkala xili ham kamyob. Kumushning asosiy massasi boshqa metallar, chunonchi, qo'rg'oshin va mis rudalari bilan birga qazib olinadi. Kumush elektr va issiqlikni boshqa metallarga qaraganda yaxshi o'tkazadi, yorug'likni yaxshi qaytaradi, kimyoviy jihatdan juda turg'un.

Kumushlash – buyumlarni korroziyadan saqlash, yaltiroq qilish va bezash maqsadida ular sirtiga galvanik usulda kumush qatlami qoplashdir.

Minerallari. Tabiatda kumush minerallar tarkibida uchraydi; sof toza kumush - Ag, argentum (akantit) - Ag_2S , pirargirit- Ag_3SbS_3 .

Sof toza kumush tabiatda misga qaraganda ancha kam, oltinga nisbatan esa taqqoslab bo'lmaz darajada kam tarqalgan. Kumushning kimyoviy toza kumushdan boshqa tarkibida 10% va undan ortiqroq oltin izomorf aralashmasi – kyustelit; misli kumush, surmali kumush xillari ham bor. Kumushning noto'g'ri donalari va yirik yaxlit bo'laklari, ya'ni sof tozalari tabiatda ko'proq tarqalgan. Kumushning rangi yangi siniq yuzada rasmiy kumushdek oqdir. Uning usti ko'pincha qora gard bilan qoplangan bo'ladi. Chizig'imetalldek yaltiroq. Kumush yaltiroq metall.

Uning qattiqligi 2,5. U juda ham pachaqlanuvchan, yupqa bargchalarga ham aylanadi va ilgaksimon bo'lib sinadi. Unda ulanish tekisligi yo'q. Solishtirma og'rligi 10,1-11,1. Kumushdek yaxshi issiqlik va elektr o'tkazgichdir.

Diagnostik belgilari kumushning rangiga, o'ziga xos ilgaksimon, zirapchasimon sinishiga, yumshoqligiga va solishtirma og'irligiga qarab aniqlanadi. U platinadan qattiqligining va solishtirma og'irligining kichikligi bilan farq qiladi. Ko'pincha sof toza, kumush bilan birga uchraydigan argentit Ag_2S qo'rgo'shin – kulrang yoki qora rangli bo'ladi. Sof toza kumush yer yuzasida oltindek barqaror emas. U ko'pincha qora rangli gard va parda bilan qoplanib qoladi.

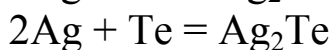
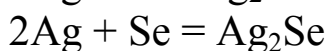
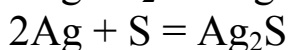
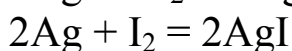
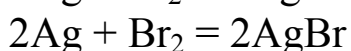
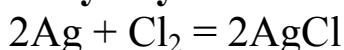
Ishlatilishi. Asosan qotishma holda tanga pul zarb qilishda, zargarlik va uy-ro'zg'or buyumlari, laboratoriya idishlari tayyorlashda, shuningdek, kimyoviy apparatlarni futerovkalashda, radiodetallarni qoplashda, kumush-rux akkumulyatori ishlab chiqarishda va boshqalarda qo'llaniladi. Ag^+ ionlar bakteriyalarni o'ldiradi, ozgina miqdori ham ichimlik suvini tozalaydi. Kumush galogenidlari (AgBr , AgI) fotomateriallar ishlab chiqarishda, kolloidal kumush va uning birikmalari (masalan, lyapis AgNO_3) tibbiyotda qo'llaniladi. Kumush asosan mis bilan qotishtirilib, kumush buyumlar, tangalar va boshqa narsalar tayyorlashda ishlatiladi. Sof kumush nozik zargarlik ishlarida, ishqor eritiladigan tigellar tayyorlashda, buyumlarni kumush bilan oqartirishda ishlatiladi. Kumushning asosiy massasi (80% ga yaqini) sof tug'ma holda emas, balki kumushga boy qo'rg'oshin-rux, oltin va mis konlaridan qo'shimcha mahsulot sifatida olinadi.

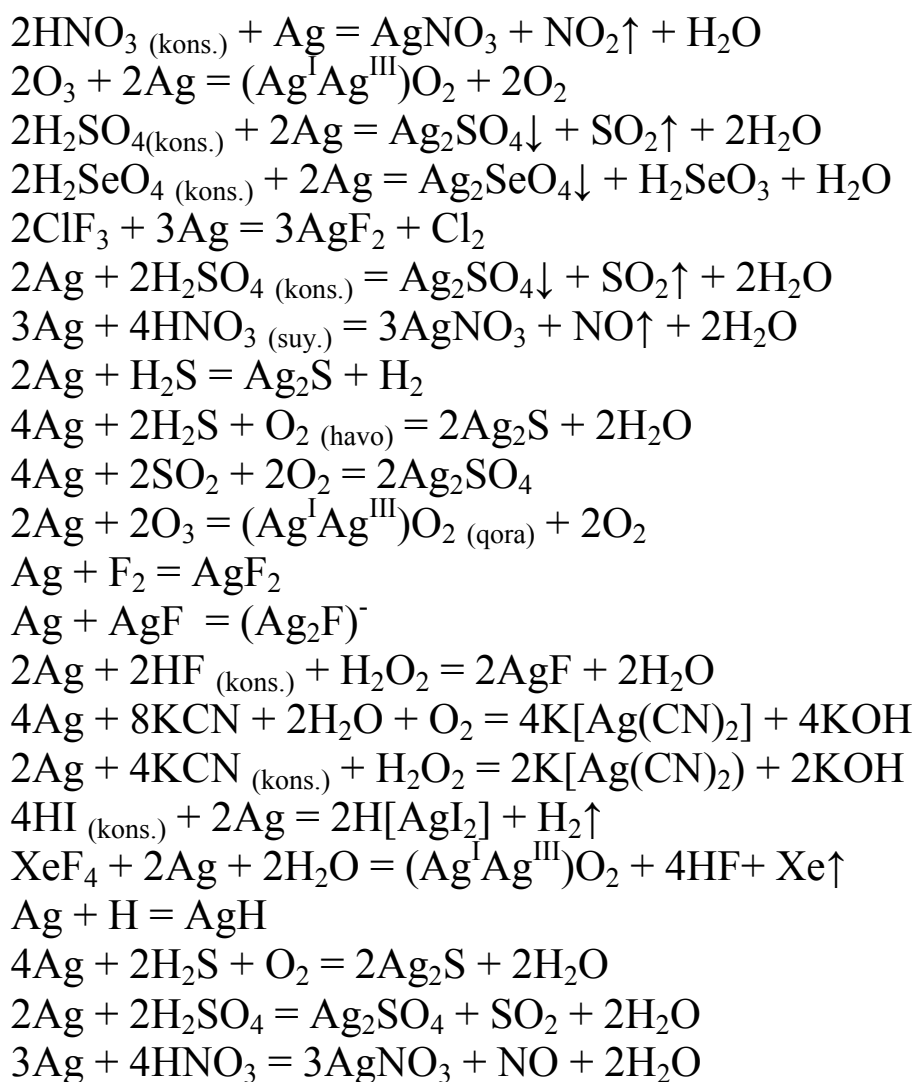
Qotishmalari. Sanoatda kumush quyidagi elementlar bilan qotishma hosil qiladi: mis, qalay va hokazo. Qotishmada qancha kumush borligi

proba bilan ko'rsatiladi. Proba 1000 hissa qotishmada necha hissa toza kumush borligini bildiradi (masalan 875 probali kumushdan uning tarkibida 87,5 kumush va 12,5 % mis bo'lgan qotishma ishlatiladi).

Olinishi. Kumush dunyoda 75% dan ortiq yo'ldosh usuli bilan qo'rg'oshin va mis sanoatida olinadi. Sof oltin olish uchun ham kumushdan tozalanadi va sof holda kumush ajratiladi. Kumush rudalar flotatsiya va gravitatsiya usuli bilan boyitilib, konsentrat olinadi, so'ng sianid eritmasida eritiladi. Kumushga boy rudalar ayrim korxonalarda osh tuzi qo'shib xlorli kuydirish orqali sulfidlar kumush xlorid holiga o'tkaziladi. Sianid eritmasidan kumushni ajratib olish uchun rux yoki Aluminiy (changi) ishlatiladi. So'ng oksidlab, tozalanadi va kumush olinadi. Qo'rg'oshin sanoatida reaktorda rux qo'shib, kumush bilan birga kimyoviy birikma hosil qiladi. Pirometallurgiya yordamida rux bug'lantirilib, qolgan kumush tozalashga jo'natiladi. Mis sanoatida esa kumush xomaki misdan anodga, so'ng elektroliz paytida shlamga o'tadi. So'ng shlam 1000⁰C atrofida eritilib, selen va tellurga bug'lantirilib, mo'ridan o'tgach, suzgichlarda ushlanadi. Eritish pechida Dore metali, ya'ni oltin va kumush qotishmasi olinadi. Keyingi jarayon affina bo'lib, oltin kumushdan ajratiladi, unda kislotalar bilan qayta ishlanib, elektroliz usuli bilan sof kumush olinadi. Shuningdek, kumush rudasi asosan qo'rg'oshin rudalari bilan aralashgan holda bo'ladi. Shuning uchun tarkibida kumush bo'lgan rudalar suyuqlantirilib, usti ochiq vannalarda kislorod ta'sirida oksidlanadi. Natijada qo'rg'oshin holda suyuqlantirilgan aralashma yuzaga qalqib chiqadi, kumush esa oksidlanmay metall holda cho'kmaga tushadi. Bundan tashqari, suyuqlantirilgan rudalarga rux ta'sir ettiriladi. Kumush ruxda qo'rg'oshindagiga qaraganda yaxshi erib, Ag₂Zn₂ holda cho'kmaga tushadi. Cho'kmani distillyatsiya qilib kumush ajratib olinadi. Sulfidli rudalardan Ag ajratib olishda, suyuqlantirilgan massaga natriy sianid ta'sir ettirilib, hosil bo'lgan kumush kompleks birikmasini rux bilan qaytarib, metall ajratib olinadi.

kimyoviy xossalari:





Kadmiy – Cd

KADMIY: belgisi - Cd. (yunon. Kadmeia – rux rudasi), (lot. Cadmium), davriy sistemaning II guruh kimyoviy elementi.

1817-yilda kashf qilingan, tartib raqami 48, atom massasi 112,40,

Bolg‘alanuvchan geksagonal kristallik kumushsimon-oq yaltiroq yumshoq metall; $t_{\text{suyuq}}=321^{\circ}\text{C}$, $t_{\text{qayn}}=767^{\circ}\text{C}$ (778°C); zichligi $8,650 \text{ g/sm}^3$, eruvchan tuzlari rangsiz va zaharli; Kadmiy suvda erimaydi, kislotalarda eriydi. ^{113}Cd izotopining neytronlarni yutish xususiyati yuqori bo‘lganidan kadmiy reaktorlarning rostlovchi sterjenlari tarkibiga kiradi. Kadmiydan qilingan himoya qoplami ruxli himoya qoplamidan mustahkamroq.

Kadmiylash atom korroziyasidan, dengiz suvi ta‘siridan himoya qilish, shuningdek, bezash uchun metall buyumlar sirtini yupqa (odatda, 10-25 mkm) kadmiy qatlami bilan qoplash. Elektrokimyoviy va vacuum (murakkab buyumlar uchun) usullarda amalga oshiriladi.

Minerallari. Tabiatda quyidagi minerallar tarkibida uchraydi:

grinokit CdS va otavit CdCO₃.

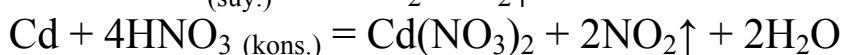
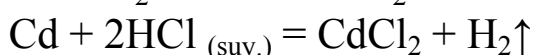
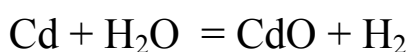
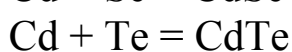
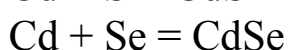
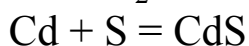
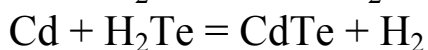
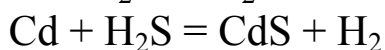
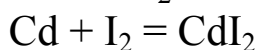
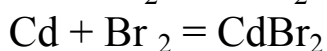
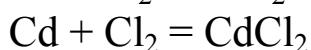
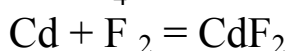
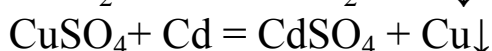
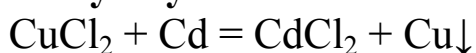
Ishlatilishi. Kadmiy yadro energetikasida keng qo'llaniladi. Bezak qoplamlari uchun ham ishlatiladi. CdS sulfidi (kadmiyli sariq bo'yoq) rassomchilikda ishlatiladi. Samolyotlar, kemalarning eng muhim detallari, shuningdek, tropik iqlim sharoitida ishlatiladigan buyumlarning sirti kadmiylanadi.

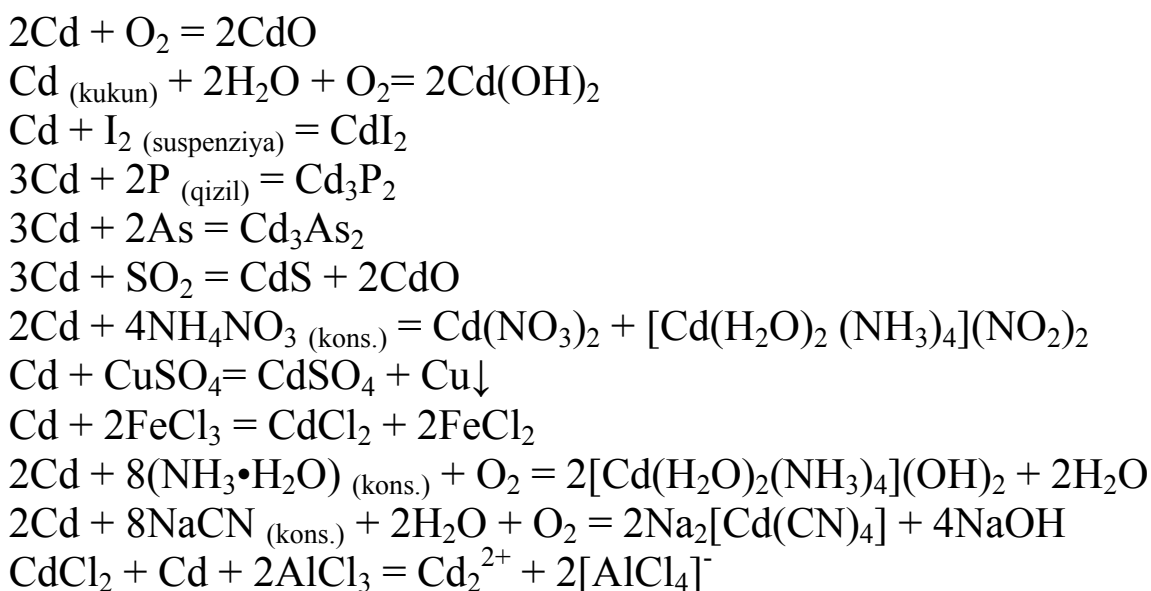
Qotishmalari. Tabiatda siyrak va tarqoq holda uchraydigan elementlar jumlasiga kiradi; rux, qo'rg'oshin va mis rudalarini qayta ishlash mahsulotlaridan ajratib olinadi.

Olinishi. Kadmiy asosan rux sanoatidagi xomashyodan olinadi.

Rux oksidi tanlab eritish orqali H₂SO₄ da eritilganda rux bilan birga kadmiy ham eritmaga o'tadi. Rux changi orqali eritmadagi kadmiy cho'ktiriladi va mis-kadmiyli kek olinadi. So'ng u yana qayta rux elektrolizida ishlatilgan eritma yordamida tanlab eritiladi. Ushbu jarayon ikki, ba'zida uch marotaba qaytarilib, kadmiy konsentratsiyasi oshgach, kadmiy g'ovaksimon holda olinadi. U yana oxirgi marotaba rux elektrolizining (H₂SO₄) elektroliti yordamida eritilib, elektrolizga jo'natiladi va kadmiy katodi metall holida olinib, qayta eritiladi va qoliplarga quyilib, kadmiy quymasi sotuvga qo'yiladi. O'zbekistonda kadmiy asosan rux-qo'rg'oshinli polimetall rudalar tarkibida bo'lib, Olmaliq rux zavodida tanlab eritish paytida rux eritmaga o'tkazilgach, qolgan qoldiq modda mis-kadmiyli kek kadmiy olish uchun asosiy manba hisoblanadi. Olmaliq sharoitida sof holda kadmiy metali ajratib olinadi.

Kimyoviy xossalari:





Indiy – In

INDIY:belgisi - In. 1865-yilda kashf etilgan [spektr chizig‘ining nil (indigo) rangidan], (lot.Indium). Indiy davriy sistema-ning III guruh kimyoviy elementi, tartib raqami 49, atom massasi 114,82. Oson eriydigan kumushrang-oq yumshoq metall; zichligi $7,31 \text{ g/sm}^3$, $t_{\text{suyuq}}=156,4^0\text{C}$, $t_{\text{qayn}} = 2050^0\text{C}$.

Minerallari. Indiy tarqoq elementlar qatoriga kiradi. Rux, qalay, qo‘rg‘oshinning sulfid minerallarida aralashma ko‘rinishida uchraydi, bolg‘alanuvchan tetragonal kristallik metall, suvda erimaydi, kislotalarda eriydi.

Ishlatilishi. Indiy korroziyaga qarshi qoplamalar, oson eriydigan qotishmalar, shishani metallga yopishtirish uchun kavsharlar tayyorlashda ishlatiladi. Indiy qog‘ozga qo‘yilganda qora iz qoldiradi. Shunday yengil eruvchanligi bo‘lganligi uchun podshipniklarni moylashda ishlatiladi.

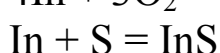
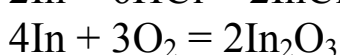
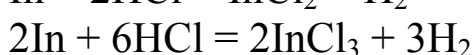
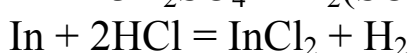
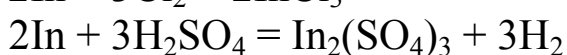
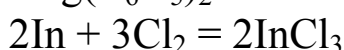
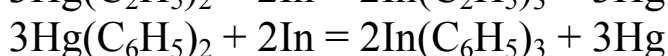
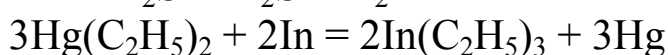
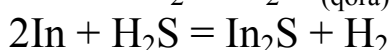
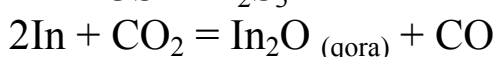
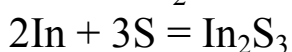
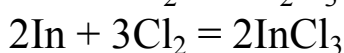
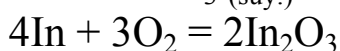
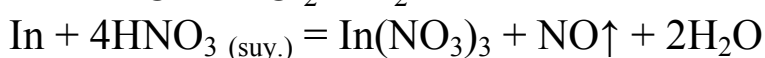
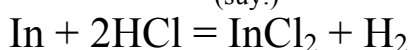
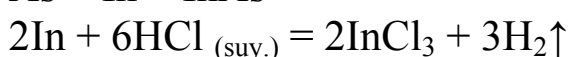
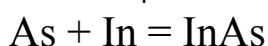
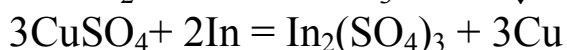
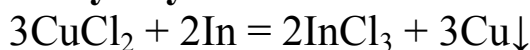
Boshqa metallar indiy bilan qoplansa, metalni korroziyadan yaxshi saqlaydi. Tish qoplash qotishmasiga indiy qo‘shilsa, qoplamasining mustahkamligini oshiradi. Indiy bilan qalay qoplamasi (1:1 og‘irligi bilan) oynani oyna bilan yoki metall bilan yaxshi kavsharlaydi. 47^0C dasuyuqlantiriladigan qotishma 18,1% bilan 41,22, 1-Pb, 10, 6-Sn va 8,2-Cd dan tibbiyotda murakkab singan suyaklarni gipslashda foydalaniladi.

Qotishmalari. Indiy va uning birikmalari (nitrid InN, fosfid (InP, antimonid InSb) YaO’ texnikasida keng qo‘llaniladi. Indiy (III) sulfide In_2S_3 sariq modda. Indiy (III) xlorid In_2Cl_3 .

Olinishi. Indiy rux, qalay va qo‘rg‘oshin sanoati chiqindilari va yarim mahsulotlaridan olinadi. U, asosan, rux va qo‘rg‘oshin sanoatidagi

xomashyoda uchraydi, shuning uchun ham uning mahsuloti, asosan, changidan ajratib olinadi. Avvaliga u eritiladi, so‘ng bir necha bor gidrolitik tozalash usulida qo‘llanilgach, indiyli eritma ammoniy kukuni yordamida sementatsiya qilinadi, olingan indiyli kristall modda kislotali eritmada eritilib, elektroliz orqali ajratib olinadi.

Kimyoviy xossalari:



Qalay – Sn

QALAY:belgisi Sn. Qalay keng tarqalgan metallar tarkibiga kirmaydi (yer po‘stlog‘ida og‘irlik jihatidan 0,008 % qalay bor), ammo rudalardan qalay suyuqlantirib olish oson bo‘lganligi uchun u insoniyatga juda qadim zamonlardan o‘z madaniy hayotining dastlabki davrlaridayoq (bronza asri) foydalangan edi. (lot. Stannium), (Umum slavyan tilidagi ol - oq yoki sariq so‘zlari o‘zagidan) yunoncha mustahkam demakdir), davriy sistemaning IV guruh kimyoviy elementi, tartib raqami 50, atom massasi

118,69; $t_{\text{suyuq}} = 231,8^{\circ}\text{C}$, $t_{\text{qayn}} = 2270^{\circ}\text{C}$ va 2362°C (u 1200°C da ucha boshlaydi). Qalay – kumushsimon-oq metall, yumshoq va plastik, havoda sekin xiralashadi. Qalay polimorf, zichligi $7,298 \text{ g/m}^3$ bo‘lgan oq yoki β -Sn ancha barqaror bo‘ladi. Sn $-231,9^{\circ}\text{C}$ da eriydi. Qalayning bir necha allotropik shakl o‘zgarishi bor; 13°C dan pastda kub shaklli kristallardan iborat kulrang kukun, bu qalay barqarordir, uning d 5,75; bu 163°C dan 18°C gacha barqaror bo‘ladi. 13°C dan 161°C gachabarqaror bo‘lgan shakl o‘zgarishi oq qalaydir, kvadrat sistemada kristallanadi; d 7,3; 161 dan yuqorida u sekin-asta rombik-shakl o‘zgarishiga aylana boshlaydi, 200°C da esa birdaniga aylanadi; bu qalay mo‘rt bo‘ladi; odatda, oq qalay kulrang qalayga aylanganda hajmi kengayib, kukunga aylana boshlaydi; bu hodisa “qalay vabosi” deyiladi; qalay buyumlarining sovuqda yemirilib, kukunga aylanib ketishining sababi ana shu qalayli ruda (odatda, kassiterit) avval flotatsiya usulida boyitiladi, so‘ngra ko‘mir va flyuslar bilan qaytariladi yoki elektr pechlarida eritiladi. Qalayning taxminan 40% i konserva sanoatida oq tunuka ishlab chiqarishga sarflanadi. Chunki qalay korroziyaga chidamli, temirni oson qoplaydi, uning korrozion mahsulotlari zararsiz.

Minerallari. Qalay minerallaridan kassiterit (qalayli tosh) SnO_2 sanoat ahamiyatiga ega, $\text{Cu}_2\text{FeSnS}_4$ stannin esa kam ahamiyatga ega.

Qalay kamdan-kam hollarda tabiatda toza (sof) holda uchraydi.

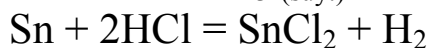
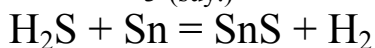
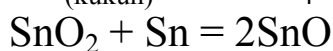
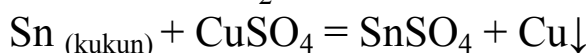
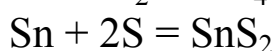
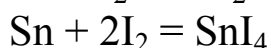
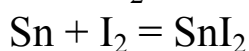
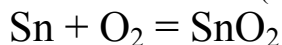
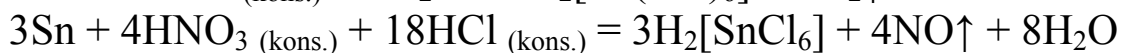
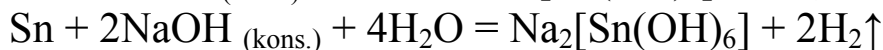
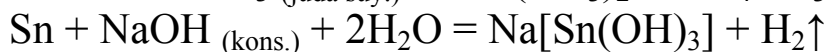
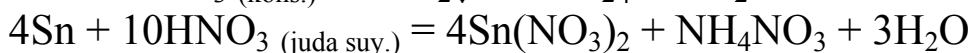
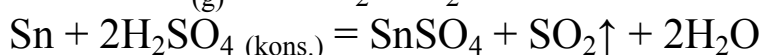
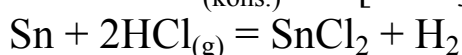
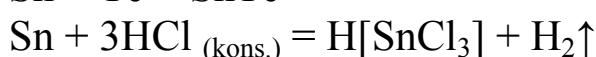
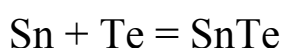
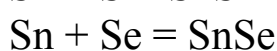
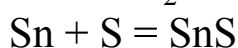
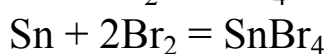
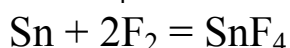
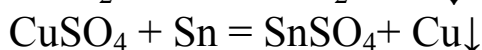
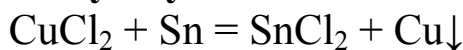
Ishlatilishi. Kislotalarda va ishqorlarda erib, tuzlar hosil qiladi. Qalay kimyo laboratoriyalarida, texnikada, qotishmalar tayyorlashda va metall buyumlarni oqlashda va shu kabilarda ishlatiladi. Qalay kavsharlash, oqartirish, bronza, bosmaxona, podshipnik va boshqa qotishmalar tayyorlashda ishlatiladi. SnS_2 sulfidi oltin yugurtirish bo‘yog‘itarkibiga kiradi. SnO_2 dioksidi issiqbardosh emallar va qo‘rg‘oshin-qalayli sirtlar tayyorlashda ishlatiladi. Yuqori tozalikdagi qalay yarimo‘tkazgichlar texnikasi va elektronikada ishlatiladi. Kassiterit mineralini qayta ishlashda ajratib olinib, elektrotexnikada qalayli plastinka va boshqa asboblarni tayyorlashda ishlatiladi.

Qotishmalari. Qalay quyidagi moddalar bilan qotishmalar hosil qiladi: bronza, latun, babbitt va tipografiyada keng qo‘llaniladigan qalayli qotishmalar mavjud.

Olinishi. Qalayli rudalarda ko‘pincha 0,2% dan 5% gacha qalay bo‘lib, u oksid (SnO_2) va sulfid ($\text{Cu}_2\text{FeSnS}_4$) holida 40-70% ni tashkil etib, avvaliga kuydiriladi, $650-850^{\circ}\text{C}$ haroratda kuydirish jarayonida oltingugurt va margimush uchib ketadi. Keyingi jarayon 30% li xlorid kislota yordamida tanlab eritiladi. Barcha nokerak elementlar, asosan,

temir, qo‘rg‘oshin, volfram va boshqalar eritmaga o‘tib, qalaydan ajratiladi. Ba’zida ZnSn konsentratlar tanlab eritilmasdan, uglerod oksidi yordamida eritma pechda qaytariladi. Ushbu jarayon asosan olovli yallig‘ qaytaruvchi eritish pechi (OP) va elektropechlarda 1150-1350⁰C haroratda olib boriladi. Olingan xomaki qalay (Sn-93-99%) olovli yoki elektrolitik rafinirlash usullari orqali keraksiz elementlardan tozalanadi va sof qalay olinadi.

Kimyoviy xossalari:



Surma – Sb

SURMA:belgisi - Sb. XVI-XVII asrlarda surma metall sifatida tan olinmagan. Davriy sistemaning V guruh kimyoviy elementi, tartib raqami 51, atom massasi 121,75; $t_{\text{suyuq}}=630,5^{\circ}\text{C}$, $t_{\text{qayn}}=1635^{\circ}\text{C}$; kislotalarda eriydi, suvda erimaydi. Surma (turkcha surme), (lot. Stibium), surmaning bir necha allotropik shakli ma'lum. Oddiy surma kumush kabi oq, juda yaltiroq metall; zichligi $6,55 \text{ g/sm}^3$. Ko'pgina boshqa metallardan farqi uning qotganda kengayishidir. Surmaning Mendeleev elementlar davriy sistemasi III guruhiga mansub metallar bilan, jumladan, kaliy va indiy bilan bo'lgan qotishmasi yarim o'tkazgichdir. Surma ishlab chiqaradigan asosiy mamlakatlar Xitoy, Meksika, Boliviya, Serbiya (ilgarigi Yugoslaviya hududi) va Rossiyadir.

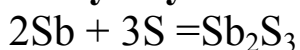
Minerallari. Surmaning eng ko'p tarqalgan minerali – surma yaltirog'i(antimonit). Surma, asosan, poligrafiya sanoatida ishlatiladi (tarkibida surma bo'lgan qotishma sovuganida kengayishi tufayli matritsa detallari aniq bo'ladi).

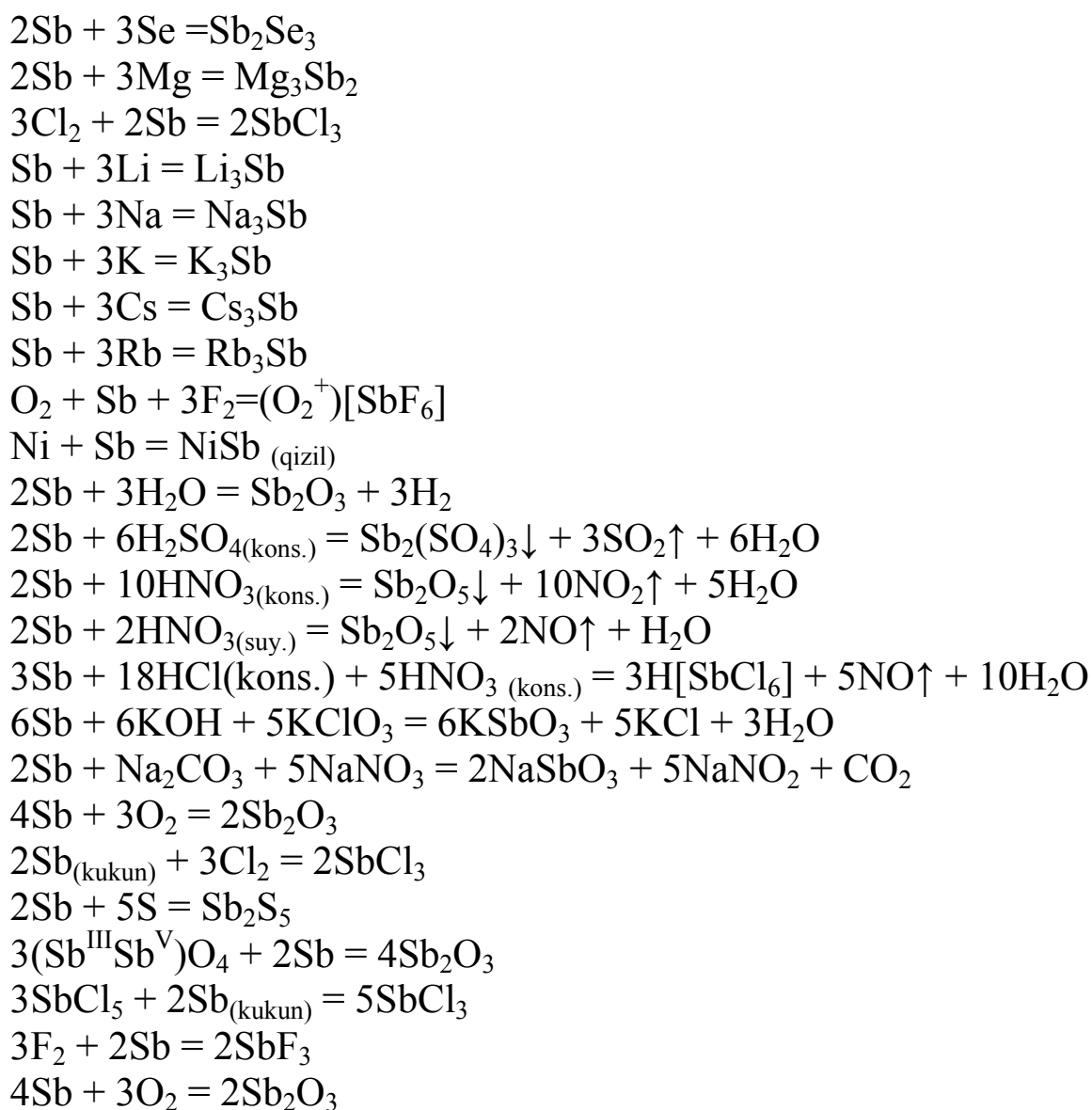
Ishlatilishi. Surma birikmalari rezina sanoati, tibbiyotda va boshqa sohalarda ishlatiladi. Tabiiy sulfid Sb_2S_3 qosh bo'yashda foydalanilgan.

Qotishmalari. Surmaning qalay, qo'rg'oshin va misli podshipnikbop qotishmasi (babbitlar) keng tarqalgan. Surmaning qo'rg'oshin va qalayli qotishmalari mashinasozlik va elektrotexnikada keng ishlatilsa, germaniy va kremniy elementlaridan iborat surmali qotishmalar elektrotexnika va elektronikada yarimo'tkazuvchi material sifatida keng qo'llaniladi.

Olinishi. Ruda tarkibidagi surma avvaliga boyitiladi va oksidlovchi-disstillyatsiya yordamida kuydiriladi. Unda surma Sb_2O_3 holida bug'lanib, chang holida suzgichlarda ushlanadi. Olingan ashyo qumoqlanib, so'ng uglerodli birikma yordamida yuqori haroratda pechda qaytariladi va rafinirlanib surma olinadi. Shuningdek, surmaga boy bo'lgan boyitmalar rudnotermik elektrpechlarida flyus va temir moddasi qo'shib eritiladi, natijada temir barcha oltingugurtni o'zida birlashtirib, shteynga va flyuslar shlakka ajralib, pechning eng ostida xomaki surma qoladi. Xomaki surma temir, oltingugurt va margimushdan rafinirlanib tozalanadi. Toza surma qoliplarga quyiladi.

Kimyoviy xossalari:





Tellur – Te

TELLUR: belgisi - Te. 1798-yilda venger tadqiqotchisi F. Myuller tomonidan kashf etilgan. Faqat 16 yildan so‘ng nemis kimyogari M. Klaprot Myuller olgan modda haqiqatdan ham yangi element ekanligini isbotlab berdi (lotincha tellurium, “tellus” - yer ismi bilan atalgan), davriy sistemaning VI guruh kimyoviy elementi, tartib raqami 52, atom massasi 127,60, zichligi 6,25 g/sm³; $t_{\text{suyuq}}=450^0\text{C}$; $t_{\text{qayn}}=1990^0\text{C}$, kumushdek oq metall, ikki shakli bor. H₂SO₄, HNO₃, NaOH larda eriydi, suvda erimaydi; metallurgiyada tellur asosan qo‘rg‘oshinning mexanik xossalarini yaxshilash uchun, ularga legirlovchi sifatida qo‘shiladi.

Minerallari. Tellurning bir qancha minerallari mavjud.
Selenli tellur-(Te,Se),

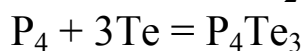
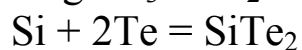
tellurovismutit - Bi_2Te_3 ,
 tetradimit - BiTe_2S ,
 gessit - Ag_2Te ,
 petsit - $(\text{Ag,Au})_2\text{Te}$,
 altait - PbTe ,
 koloradoit - NgTe ,
 krennerit - AuTe_2 ,
 kalaverit - AuTe_2 ,
 silvanit - $(\text{Ag, Au}) \text{Te}_2$,
 melonit- NiTe_2 ,
 niggliit- PtTe_3 ,
 montanit- $\text{Bi}_2\text{TeO}_4[\text{OH}]_4$.

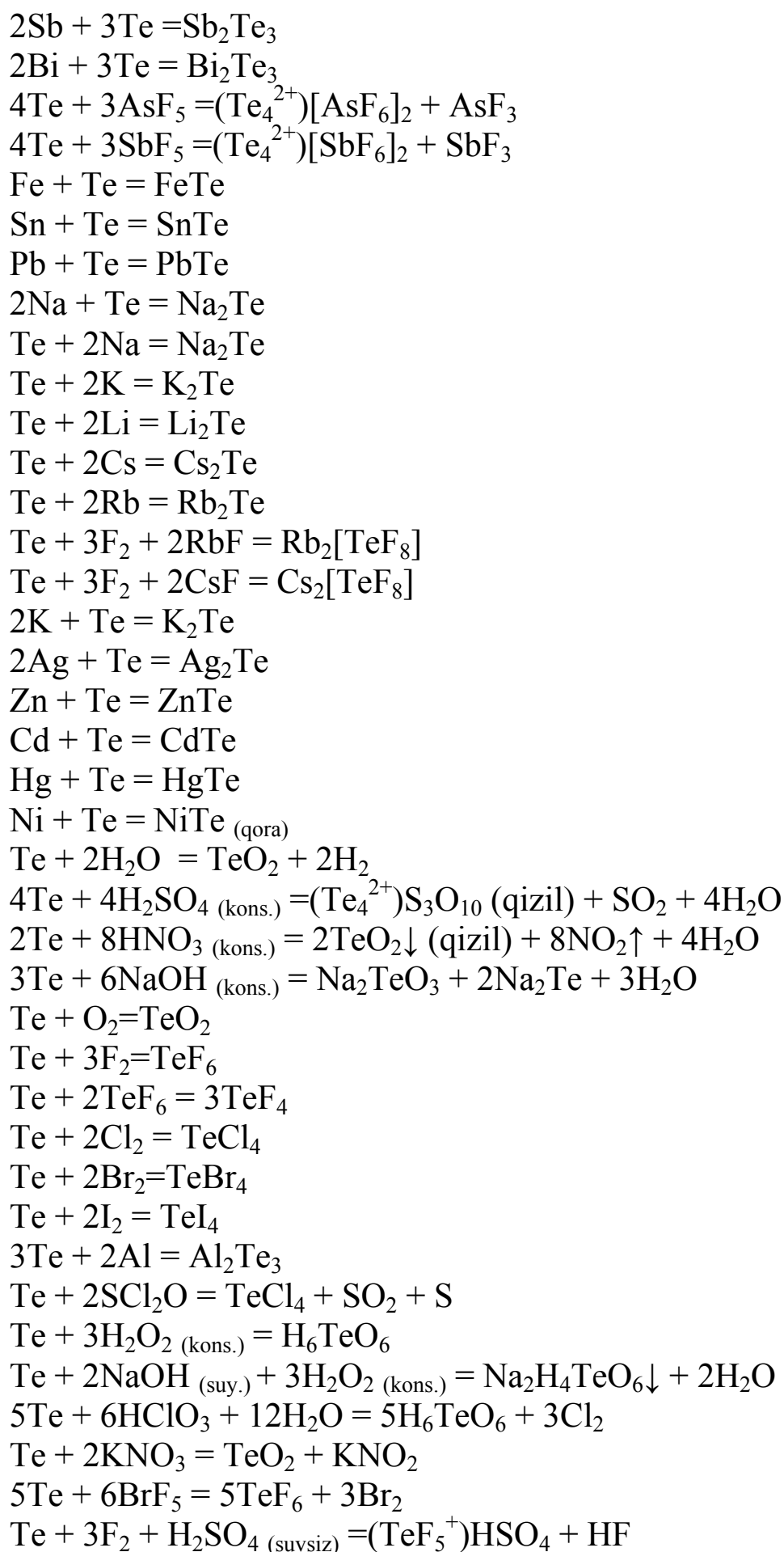
Ishlatilishi. Qo'rg'oshin kabellarga qattqlik berish uchun ishlatiladi; birikmalari esa gazolinning yonishini tezlatish uchun, shisha va chinni bo'yog'isifatida, fotografiya va mikrobiologiyada ishlatiladi. Anchagina ko'p mustaqil minerallar hosil qiladi, biroq sanoatda uni, asosan, mis elektrolit zavodlari chiqindilaridan olinadi. Uning analogi – selenga qaraganda dunyo bo'yicha tellur kam ishlab chiqariladi. Tellurning metallar bilan birikmalari yarimo'tkazgich xossalariga ham, turli nurlanishlarga sezgirlik xossalariga ham ega. Shu tufayli tellur televizion trubkalar, dozimetrlar, nurlanish schetchiklari va boshqalarda ishlatiladi.

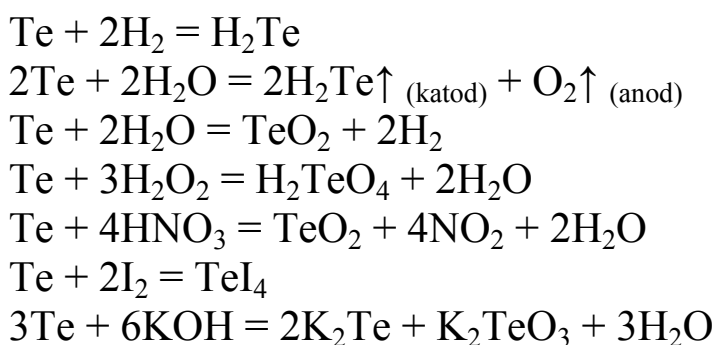
Qotishmalari. Qo'rg'oshin tarkibida 0,5% tellur aralashmasidagi qotishma mavjud.

Olinishi. Tellur uchun asosiy manba bu mis sanoatidagi anodli shlamdir. Uning tarkibida 0,3% - 8,0% gacha bo'ladi. Shuningdek, tellur sulfat kislotasi olish texnologiyasidagi shlamda, selyuloza-qog'oz sanoatida, qo'rg'oshin, rux sanoatidagi shlamlarda ham uchraydi. Uni qayta ishlash paytida tellur ishqorli yoki sodali-ishqorli, ba'zida sulfatli yoki xloridli eritma tarkibiga o'tkaziladi. Tellur gidrolitik usul bilan cho'ktiriladi. Shuningdek, u ekstraksiya orqali ham ajratib olinadi. Mis eritish zavodlarida shlamni avvaliga kuydirib (350°C - 450°C), selen va tellur oksidlanadi, so'ng Dore qotishmasi olinadi (texnologik jarayon tasvirioltin va selen olish texnologiyasida ko'rsatilgan).

Kimyoviy xossalari:







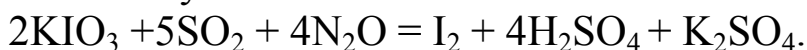
Yod – I

YOD: belgisi - I. (Jodum lotincha bo‘lib, binafsha demakdir) davriy sistemaning VII guruh kimyoviy elementi, tartib raqami 53, atom massasi 126,9044, rombik kristallardan iborat to‘q kulrang modda; 46,5⁰C dan pastda barqaror bo‘lgan monoklinik kristall formasi ham bor, o‘ziga xos hidi bor; zichligi 4,95 g/sm³ (4,9320), t_{suyuq}=114,2⁰C, t_{qayn}= 184⁰C; yod odatdagi haroratda uchib turadi; sekin qizdirilganda ham suyuqlanmay uchadi; bug‘lari ikki atomdan iborat bo‘lib, binafsha tuslidir (yod nomini 1813-y. Gey-Lyussak taklif etgan); suvda oz eriydi (⁰0C da 5524 g suvda 1g yod eriydi); ba‘zi organik suyuqliklarda yaxshi eriydi; spirtidagi va efirdagi eritmasi qo‘ng‘ir; uglerod sulfiddagi va xloroformdagi eritmasi – binafsha rangdadir. Yodning bunday har xil tusda bo‘lishining sababi shuki, u erituvchi molekulalar bilan birikib, turli solvatlar hosil qiladi.

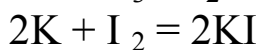
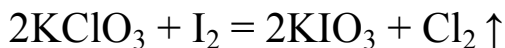
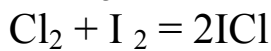
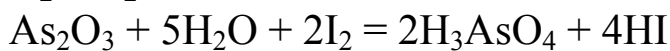
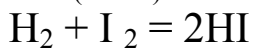
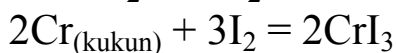
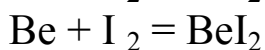
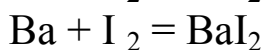
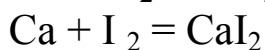
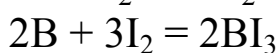
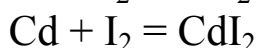
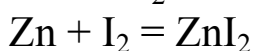
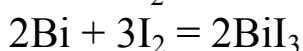
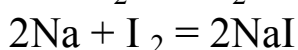
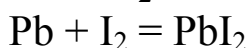
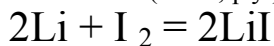
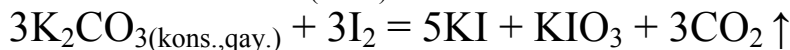
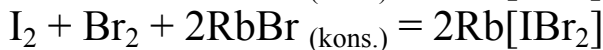
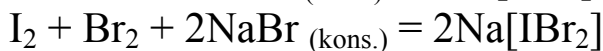
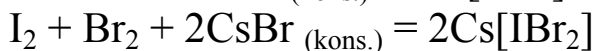
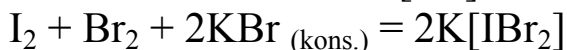
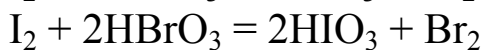
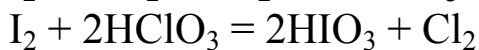
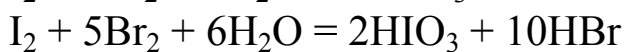
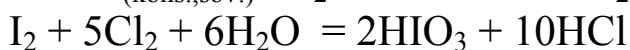
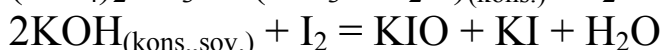
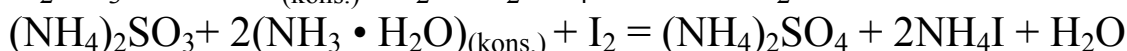
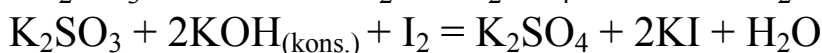
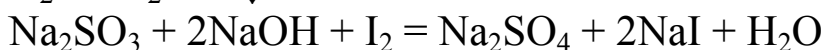
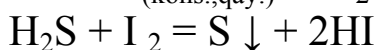
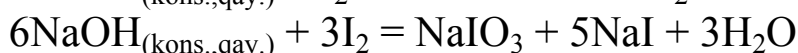
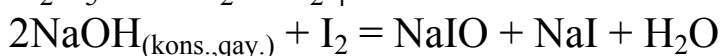
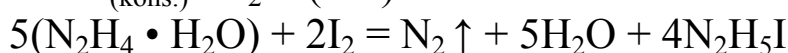
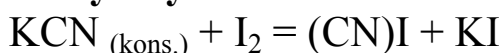
Minerallari. Yodning quyidagi minerallari mavjud: mayesrit – 4 AgI·CuI, yodirit - AgI, argentoyarozit - AgFe₃(SO₄)₂[OH]₆.

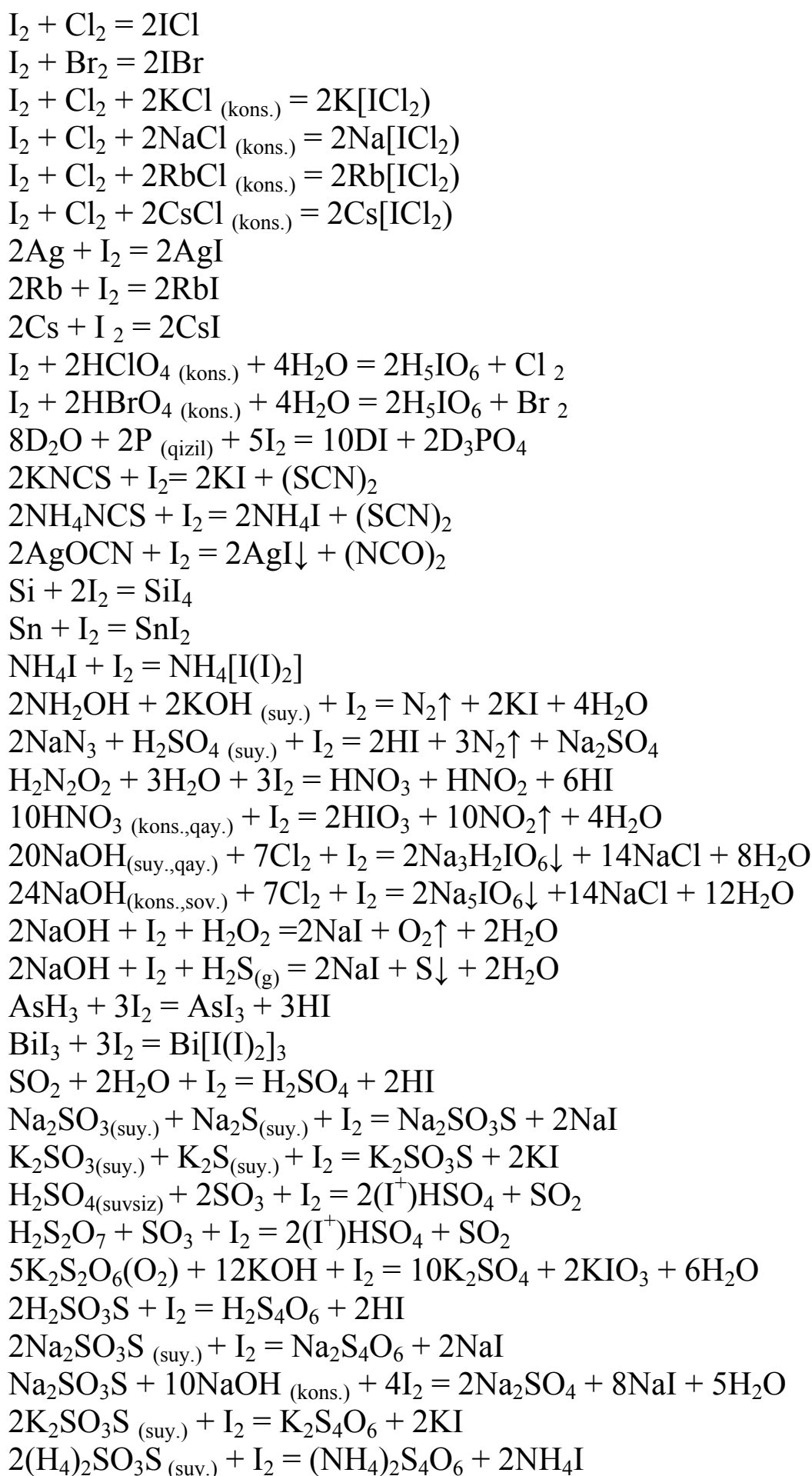
Ishlatilishi. Yod kimyo laboratoriyalarida va tibbiyotda ishlatiladi. Yod eritmasi qo‘ng‘ir tusli suyuqlik bo‘lib, yodning etil spirtidagi eritmasi sifatida tibbiyotda keng qo‘llaniladi. Shuningdek, yod zaharli bo‘lmagan, hidsiz ochiq qo‘ng‘ir kukun yodoform o‘rnida antiseptik sifatida ishlatiladi

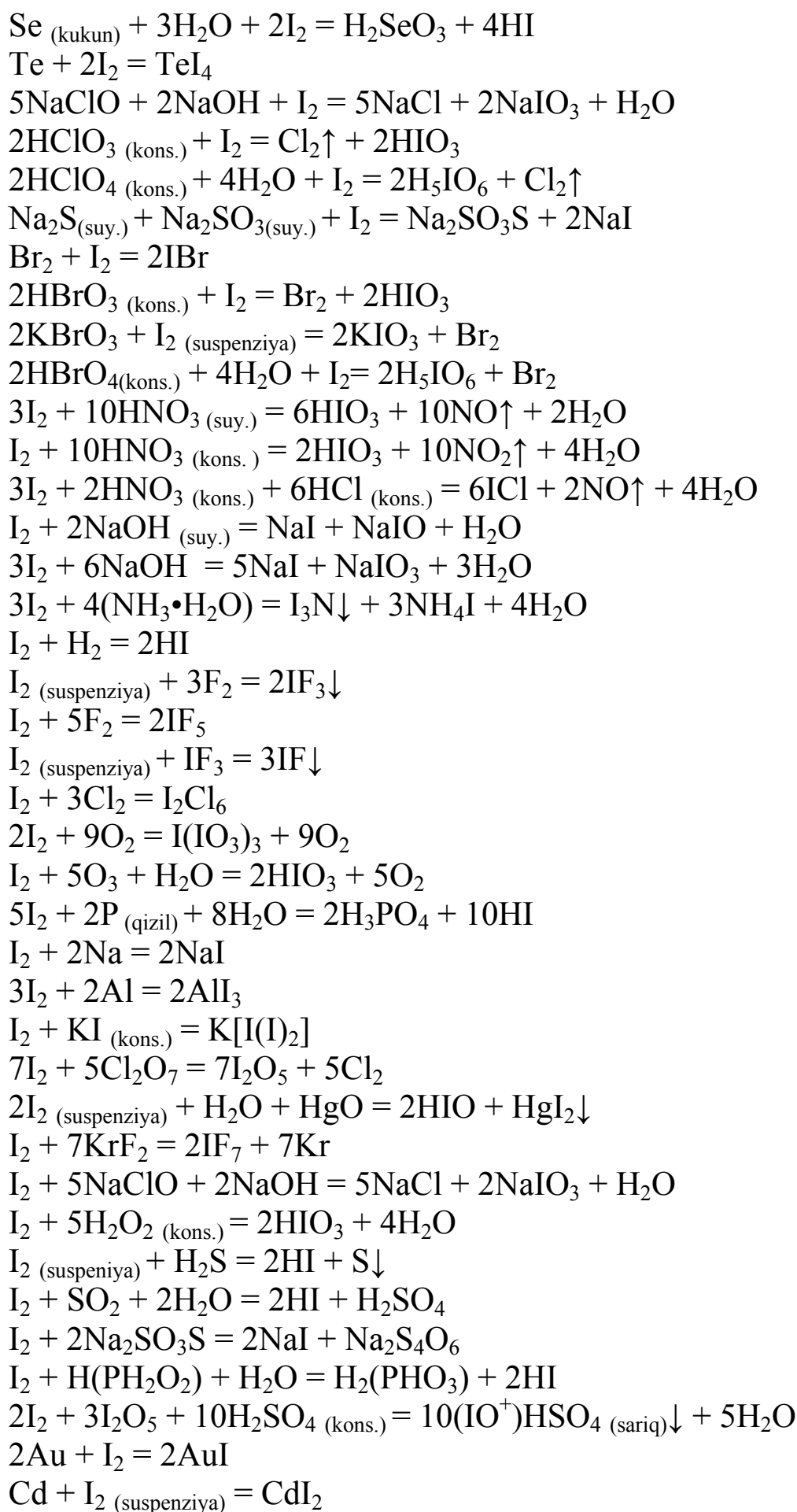
Olinishi. Yod sanoat usulida kaliy yodid tarkibli minerallarni xlorldash reaksiyasi olib boriladi, natijada kristall holdagi yod moddasi ajratib olinadi. Mayesrit va boshqa minerallari sanoat usulida qayta ishlash jarayonida olinadi. Shuningdek, yodning asosiy miqdori chili selitrasi natriy nitrat eritmasi tarkibida bo‘ladigan, uning kaliy yodid tuzidan olinadi. Natriy nitrat kristallangandan keyin eritmaga oltingugurt (IV) oksidi yuboriladi, shunda kaliy yodid erkin yodga qadar qaytarilib, sof kristall holda yod olinadi.

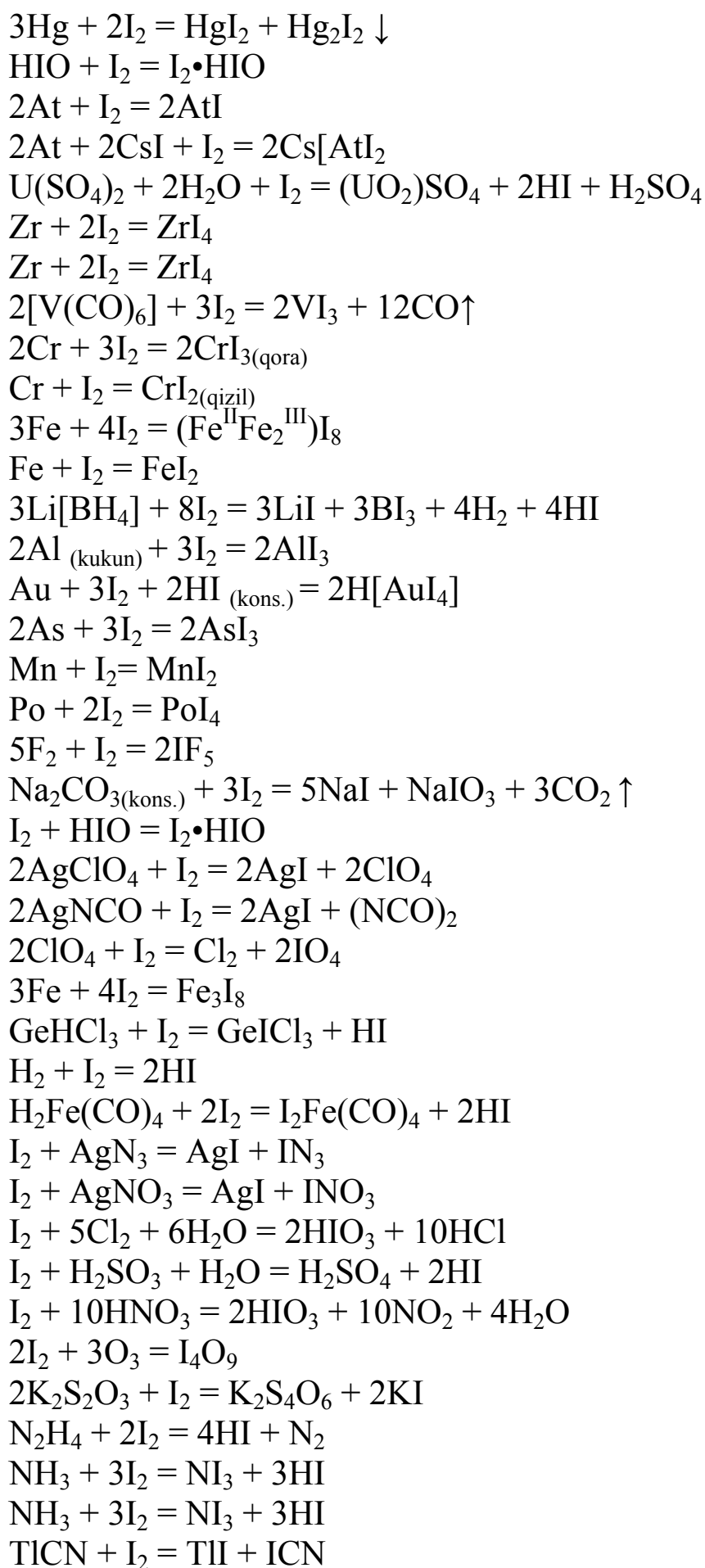


Kimyoviy xossalari:









Seziy – Cs

SEZIY:belgisi - Cs. Lotincha „cesius”-havorang soʻzidan olingan), 1860 yilda R.Bunzen va G.Kirxgof tomonidan kashf etilgan, kumushday oq faol ishqoriy metall; davriy sistemaning I guruh kimyoviy elementi. Seziy ishqoriy metallar guruhiga mansub, tartib raqami 55, atom massasi 132,9054; zichligi 1,900 g/sm³; $t_{\text{suyuq}}=28,5^{\circ}\text{C}$, $t_{\text{qayn}}=670^{\circ}\text{C}$. Seziy – oltindek sargʻish, tovlanadigan, juda yumshoq metall, suvni ajratadi, spirtida va kislotalarda eriydi. Xossalari boʻyicha kaliyga, natriyga oʻxshash, lekin kimyoviy jihatdan ancha faol; havoda oʻz-oʻzidan darhol alanganadi, suv bilan shiddatli reaksiyaga kirishib, portlash yuz beradi.

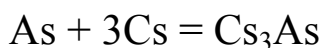
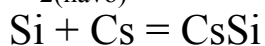
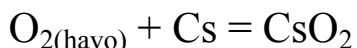
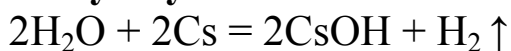
Minerallari. Seziy quyidagi minerallar tarkibida boʻladi: pollutsit - Cs[AlSiO₂O₆] va biotit.

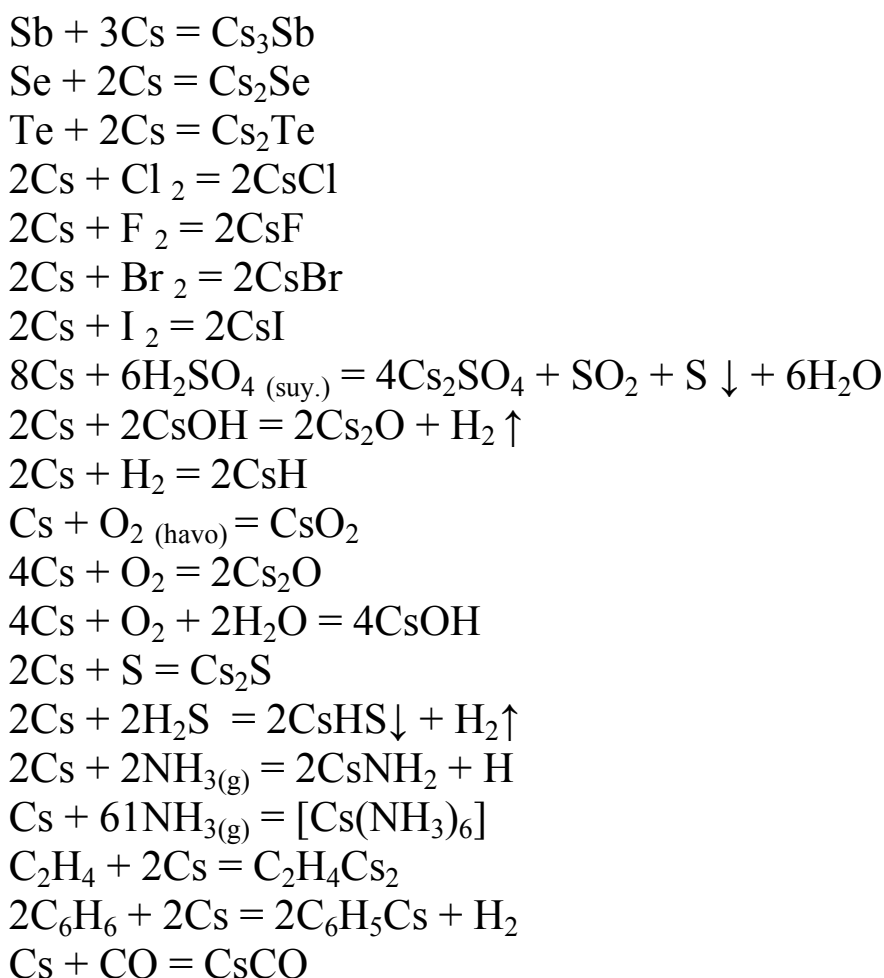
Ishlatilishi. Seziy asosan fotoelementlar (yorugʻlikka sezgirligi barcha metallarnikidan yuqori), gaz yutgichlar (vakuum lampalaridan qoldiq havoni yoʻqotishni taʼminlaydi) ishlab chiqarishda va fotokatod qotishmalarni tayyorlashda ishlatiladi. Kelgusida “Seziy plazma” sini ionli raketa dvigateli (RD) da qoʻllashning istiqboli bor.

Qotishmalari. Seziy qotishmalari mis, kumush, oltin elementlari bilan olinadi.

Olinishi. Faolligi boʻyicha rubidiydan ham ustun turadigan seziy koʻp jihatdan unga oʻxshab ketadi. Rubidiy kabi ochiq havoda, xona haroratida havo va kislorod bilan tez reaksiyaga kirishib ketadi, yonadi, suvni parchalaydi, galogen bilan birikadi. Rubidiy kabi xlorid seziy vakuumda (boʻshliqda) qizdirilib, kalsiy metali bilan qaytariladi. Shuningdek, elektrokimyoviy usul va sirkoniy metali bilan qaytarish usullari ham sanoatda qoʻllanib kelinmoqda. Seziyning qotishmasi katod bilan erigan tuzlarni elektroliz qilish usuli bilan eritmadagi metallardan ajratib olinadi. Surma - seziy qotishmasidir. Ushbu qotishma ham boʻshliqda bugʻlatish orqali choʻkmaga oʻtkaziladi. Qattiqligi, hatto eng yumshoq elementdan biri boʻlgan rubidiydan ham yumshoq, yaʼni mineralogik shkala boʻyicha 0,2 % ni tashkil etadi.

Kimyoviy xossalari:





Bariy – Ba

BARIY: belgisi - Ba. 1808-yilda ingliz kimyogari G.Devi bariyni sof metall holida olishga muvassar bo‘ldi. Bundan 30 yil muqaddam, 1774-yilda shved kimyogari K. Sheele kimyoviy element bariyni “og‘ir yer” ko‘rinishida – BaO oksidini - kashf etdi. Bariy (yunon. “barys” – og‘ir) (lot. “barum” – og‘ir so‘zidan olingan) ishqoriy yer metallar guruhidagi kimyoviy element, davriy sistemaning II guruh elementi, tartib raqami 56, atom massasi 137,34; zichligi 3,780 g/sm³ $t_{\text{suyuq}}=710^0\text{C}$, $t_{\text{qayn}}=1640^0\text{C}$. Kumushdek oq metall; bariyning suvda eriydigan tuzlari nihoyatda zaharli va yumshoq kumushsimon oq metall.

Minerallari. Bariyning keng tarqalgan minerallari – barit (og‘ir shpat) BaSO₄ va viterit CaCO₃. Bariy va uning birikmalari radioaktiv varentgen nurlaridan himoyalaydigan materiallarga qo‘shiladi. Bariy titanat BaTiO₂ - muhim segnetoelektrlardan biri.

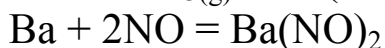
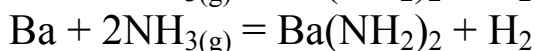
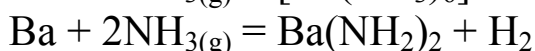
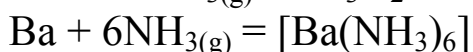
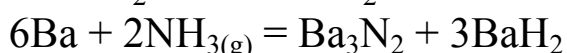
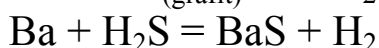
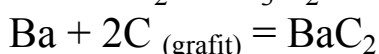
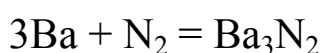
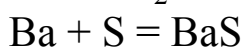
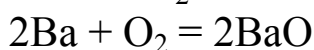
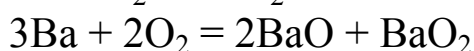
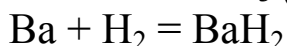
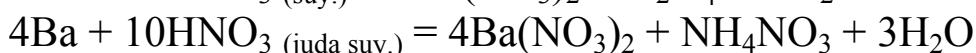
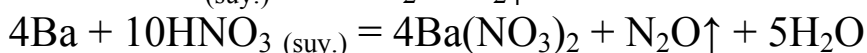
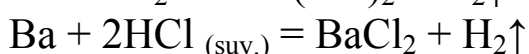
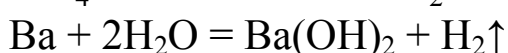
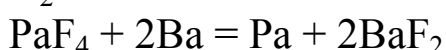
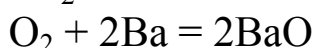
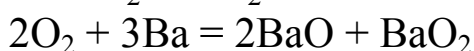
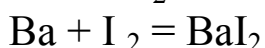
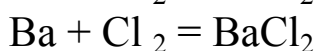
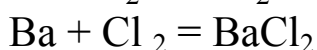
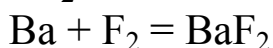
Ishlatilishi. Odatda, metall o‘z oksidini Aluminiy bilan tiklab olinadi. Qotishmalari, masalan, qo‘rg‘oshin (antifraksion va bosmaxona qotishmalari), Aluminiy, magniy bilan (vakuum ustanovkalardagi gaz

yutgichlar) ishlatiladi. Bariy nitrat $Ba(NO_3)_2$ - pirotexnikada, bariy xromat $BaSrO_4$ (sariq) va manganat (ko‘k) – bo‘yoq va boshqalarni tayyorlashda va po‘lat qotishmalarini tayyorlashda ham keng ishlatiladi.

Qotishmalari. Bariyning Aluminiy, mis, rubidiylar bilan vakuum texnikasi uchun qotishmasi olinadi.

Olinishi. Bariy tarkibli birikmalarni qayta ishlash natijasida maxsus texnologiya qo‘llanilib, ya‘ni suyuq oyna nokerak tog‘ jinslaridan depressor sifatida ishlatilib, flotatsiya orqali barnitli boyitma erkin holda ajratib olinadi. Viterit $BaSO_3$ ning xloridli tuzlarini elektroliz qilish yo‘li bilan bariy erkin ajratiladi. Toza bariy alyumotermiya usulida sof holda olinadi. $3BaO + 2Al \rightarrow Al_2O_3 + 3Ba$ faol bo‘lgani uchun kerosinli idishda saqlanadi.

Kimyoviy xossalari:



Lantan – La

LANTAN:belgisi - La. 1839-yilda K.Mosander tomonidan kashf etilgan (nomi yunoncha “Lantanum”-yashiraman degan So‘zdan olingan), davriy sistemaning III guruh kimyoviy elementi, tartib raqami 58, atom massasi 138,91; oq kumushsimon geksagonal kristallikmetall, zichligi $6,15\text{g}/\text{sm}^3$; $t_{\text{suyuq}}=920^0\text{C}$, $t_{\text{qayn}}=3454^0\text{C}$; kimyoviy jihatdan faol, uch valentli; suvda va kislotalarda eriydi. Lantanoidlar kimyoviy xossalari jihatidan lantanga yaqin bo‘lgan 14 elementning umumiy nomi; bular, Ce - seriy, Pr - prazeodimiy, Nd - neodimiy, Pm - prometiy (yoki IIilliniy), Sm - samariy, Eu - yevropiy, Gd - gadoliniiy, Tb - terbiy, Dy - disproziy, Ho - golmiy, Er - erbiy, Tm - tuliy, Yb - itterbiy, Lu – lyutetsiy (yoki Cp - kassiopiy). Bularning sirtqi ikki elektron qobiqlari qariyb bir xil tuzilishdadir, faqat sirtidan 3-qavatda, ya’ni atomlarning 4-N qavatidagi f guruhida farq bor, ham shu f elektronlar to‘lib boradi va 14 ga yetadi. Bu elementlarning kimyoviy xossalari bir-biriga nihoyatda o‘xshash, spektrlari ham o‘xshaydi, hammasi kuchsiz asoslar beradi; oksidlari suvda kam eriydi; hammasi ham R_2O_3 tipida oksid hosil qiladi; ular siyrak yer elementlari yoki lantanoidlar deb ham ataladi.

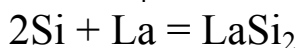
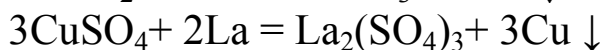
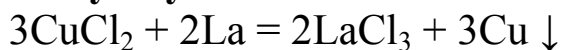
Minerallari. Tarkibida 11% Nb_2O_5 bo‘ladigan murakkab tarkibli mineral; shuningdek, oltingugurt, fosfor, azot va kislorod bilan birikkan birikmalari mavjud (LaS , La_2S_3 , La_3S_4 , La_2O_3 , LaS_2).

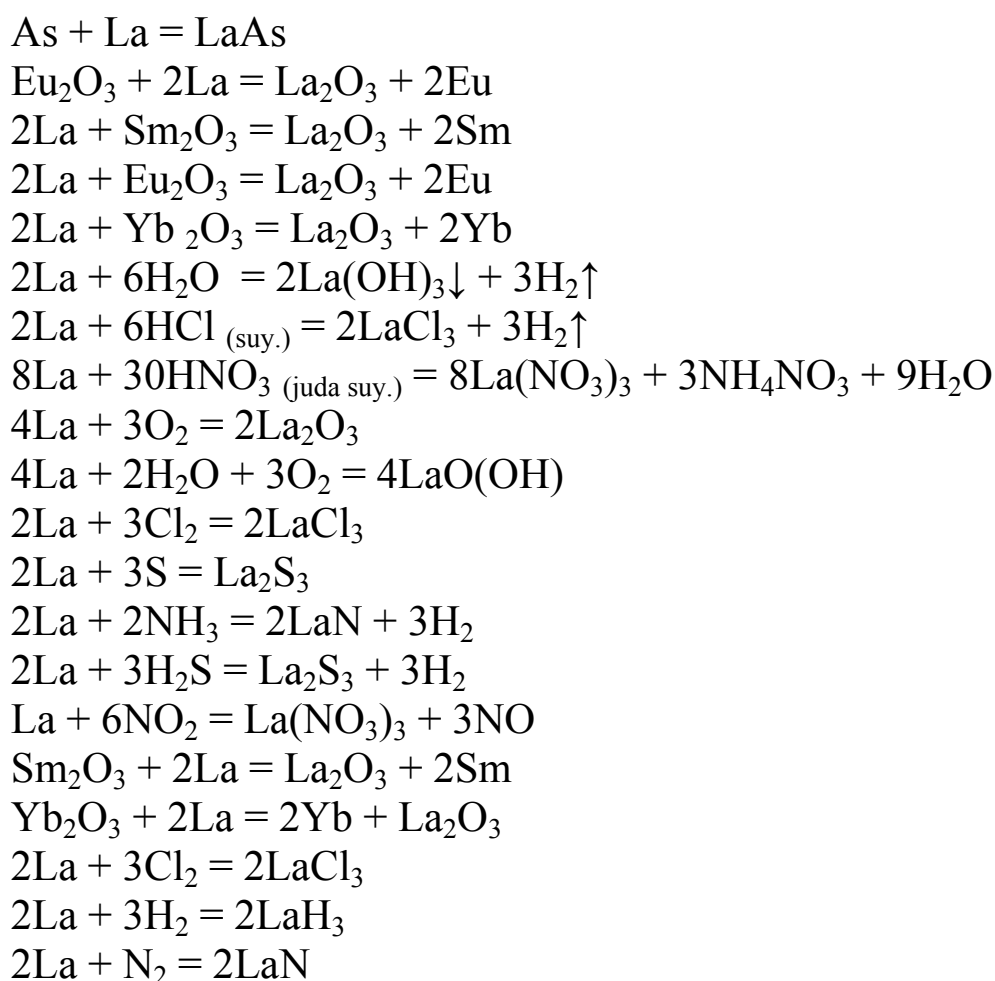
Ishlatilishi. Sanoatda asbobsozlik, kosmik raketalarda ayrim metall qismlarini tayyorlashda ishlatiladi. Shuningdek, metallurgiyada legirlovchi qo‘shimchalar sifatida va o‘ta yuqori elektr o‘tkazgichli qotishma sifatida qo‘llaniladi.

Qotishmalari. Po‘latni legirlashda turli metallar – marganes, xrom va lantanlarning qo‘shilgandagi birikmasi

Olinishi. Lantanni rudalardan ajratib olish texnologik jarayonlari ko‘p mehnat talab qiladigan ish. Bunga rudani boyitish, oraliq mahsulotlar La_2O_3 yoki hosil qilish, turli kimyoviy usullar bilan qayta ishlash kiradi. Lantan (III) oksidi olinib, magniy bilan metallotermik qaytarish orqali olinadi. Lantanni olish uchun fluoridlar va xloridlarni kalsiy, ishqoriy metallar bilan o‘zaro ta’siridan ham foydalaniladi.

Kimyoviy xossalari:





Tantal – Tl

TANTAL: belgisi -Ta. Tantal 1802-yilda shved kimyogari Ekeberg tomonidan finlandiya va Shvetsiyada minerallardan topishgan. 1844-yil nemis kimyogari Rozening aniqlashicha, kolumbit mineralining tarkibida tantal va niobiy elementlari mavjud ekan. 1903-yilda nemis kimyogari Bolton tomonidan ilk bora toza holda tantal olindi. Keyinchalik qadim yunon afsonaviy qahramoni Tantal ismi bilan atalgan. Tantal (bo‘ynigacha suvda turib tashnaligini qondira olmagan afsonaviy shoh Tantal nomidan, “tantal azobi” ifodasi shundan; toza holda olish qiyin bo‘lgani uchun shunday atalgan), davriy sistemaning V guruh kimyoviy elementi, (lot. Tantalum), tartib raqami 73, atom massasi 180,9479. Tantal kulrang-oq, juda qiyin suyuqlanadigan metall; zichligi 16,6 g/sm³; $t_{\text{suyuq}} = 2997^{\circ}\text{C}$, $t_{\text{qayn}} = 5287^{\circ}\text{C}$. Tantal kam uchraydigan element; tabiatda niobiy bilan birga uchraydi (tantalning yer qobig‘idagi umumiy miqdori niobiya nisbatan 8 marta kam).

Minerallari. Tantalning 100 ta minerallari mavjud bo‘lib, shundanta minerali juda keng tarqalgan: tantalit-kolumbit, piroxlor, loparit. Tantalit-

kolumbit - $(\text{Fe}, \text{Mn})[(\text{Ta}, \text{Nb})\text{O}_3]_2$. Formuladan ma'lumki, mineral tarkibida asosan temir bilan marganes qo'shimchalari bor. Agar mineral tarkibida niobiy ko'proq bo'lsa, u kolumbit deb, tantal tarkibi ko'proq

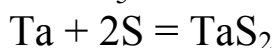
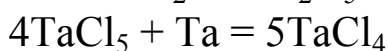
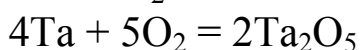
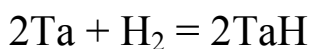
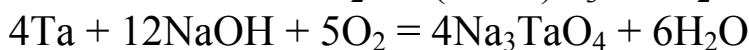
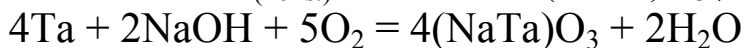
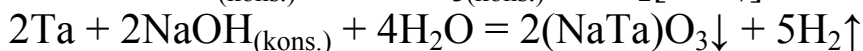
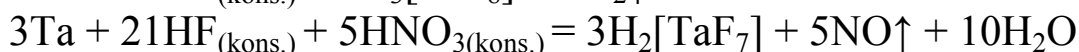
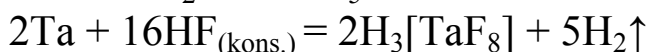
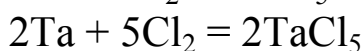
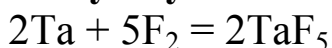
Bo'lsa, tantalit deb ataladi. Piroxlor- $(\text{Na}, \text{Ca} \dots)_2(\text{Nb}, \text{Ti})_2\text{O}_6[\text{F}, \text{OH}]$. Mineralniobato-titanatdan tashqari natriy, kalsiy, siyak yer elementlari va boshqa noyob elementlardan iborat. Loparit- $(\text{Na}, \text{Ca}, \text{Ce} \dots)_2(\text{Ti}, \text{Nb})_2\text{O}_6$. Bu mineral Kolsk yarim orolida juda ko'p joylashgan bo'lib, uning tarkibida tantal niobiyga qaraganda 15 barobar kamdir.

Ishlatilishi. Tantal ixcham elektrolitik kondensatorlar, elektron lampa detallari, umuman olganda, radioelektronika va elektrotexnikada umumiy ishlab chiqarilgan tantalning 60-70% i ishlatiladi. Bunga uning o'ta yuqori haroratda erimasligi sababdir. Elektron lampa va yuqori quvvatli generator lampalarining asosiy qismi anodlar, to'rlar va elektron katodlar shular jumlasidandir. Kimyoviy apparaturalar tayyorlashda, tibbiyotda esa tantalli yupqa ingichka simlar odam suyaklarini, asab tomirlarini ulashda keng qo'llaniladi, chunki metall tanaga mikroba tushirmaydi va hech qanday zarar keltirmaydi.

Qotishmalari niobiy, volfram, sirkoniy, gafniy va boshqa elementlar qo'shilgan tantal asosidagi qotishmalar. Agressiv va suyuq metall muhitlarda olovbardoshligi yuqori bo'lgan materiallar. Raketa soplolari, reaktiv dvigatel detallari, elektr vakuum asboblari va boshqalarni tayyorlashda ishlatiladi.

Olinishi. Loparit boyitmalarni qayta ishlashda xlorlash va sulfat kislota bilan qayta ishlash usuli keng qo'llaniladi. Tantal va niobiy ftorid kislotali muhitdan suyuqlik bilan ekstraksiya qilish usulida ajratib olinadi, metall esa tantal ftorid kompleksi (kaliy ftorotantalot) ni qaytarish yo'li bilan olinadi.

Kimyoviy xossalari:



Volfram – W

VOLFRAM: belgisi - W. 1781-yil shvedkimyogari Sheele tomonidan kashf etilgan, davriy sistemaning VI guruh kimyoviy elementi (lot. Wolframum), tartib raqami 74, atom massasi 183,85. Qiyin eriydigan metall; zichligi $19,3 \text{ g/sm}^3$; $t_{\text{suyuq}}=3380^{\circ}\text{C}$, $t_{\text{qayn}}=5900^{\circ}\text{C}$; “Og‘ir tosh” nomi bilan ataluvchi tungsten mineralini kislota yordamida parchalash tufayli volfram ajratib olinganligi uchun ham Angliya, AQSH, Fransiya mamlakatlarida haligacha bu element tungsten deb ataladi. Ko‘pgina Yevropa mamlakatlari, Olmoniya va MDH da volfram deb nomlanadi. Kub shaklidagi kristall kumushday oq, og‘ir metall, suvda erimaydi, konsentratlangan qaynoq KOH da erimaydi, NH_3 da HNO_3 da va zar suvida oz eriydi. Tabiatda kam tarqalgan element, yer qobig‘ida 10-4 % (massa bo‘yicha) ni tashkil etadi xolos. Volfram zaxiralari MDH, Kanada, Avstraliya, AQSH, Janubiy va Shimoliy Koreya, Boliviya,

Braziliya, Portugaliya mamlakatlarida ko‘p topilgan. Metall hisobi bo‘yicha chet ellarda yiliga o‘rtacha 30-32 ming tonnadan ortiq volfram boyitmasi ishlab chiqarilmoqda.

Minerallari. Uning 15 ga yaqin minerallari mavjud, biroq tabiatda, asosan, volframit, sheelit minerallarida bo‘ladi va shu minerallardan olinadi. Volframit $(\text{Mn}, \text{Fe})\text{WO}_4$. Bunda agar temir 80% dan ortiq bo‘lsa, ferberit (FeWO_4) aksincha, marganes 80% dan yuqori bo‘lsa, gyubnerit deb ataladi. Zichligi $7,1-7,9 \text{ g/sm}^3$, qattiqligi mineralogik shkala bo‘yicha 5-5,5. Uning tarkibida WO_3 76,3-76,8% ni tashkil etadi. Sheelit CaWO_4 kalsiyli bu mineralning zichligi $5,9-6,1 \text{ g/sm}^3$, qattiqligi mineralogik shkala bo‘yicha 4,5-5. U magnitlangan emas.

Ishlatilishi. Jami ishlab chiqarilgan volframning 50% igacha po‘latishlab chiqarishga sarflanadi. 8-20% qo‘shilgan volframli turli po‘lat qotishmasidan og‘ir sanoatda eng kerakli bo‘lgan tez qirquvchi va o‘yuvchi asbob-uskunalar olishda qo‘llaniladi. Shuningdek, volfram po‘latlarni legirlashda, yeyilishga chidamli va issiqbardosh qattiq qotishmalar olishda keng qo‘llaniladi. Qiyin eruvchanligi va yuqori haroratlarda bug‘ bosimi pastligidan elektr lampalarining cho‘g‘lanish tolalari, hamda elektronika va rentgen texnikasi detallari uchun material sifatida ishlatiladi.

Qotishmalari. Volframning metallar (molibden, reniy, mis, nikel, kumush), oksidlar (ThO_2), karbidlar (TaC , NbC , ZrC) va boshqa birikmalar bilan qotishmasi mavjud. Asosiy afzalliklari – suyuqlanish

haroratining yuqoriligi, elastiklik modulining kattaligi, issiqlikdan kengayish koeffitsiyentining pastligi bo'lsa, kamchiliklari – uy haroratida plastikligi va oksidlanishga qarshiligi pastligidir. Volfram qotishmalari buyumlari va yarim fabrikatlari, asosan, kukun metallurgiyasi usulida, kamdan-kam vakuum - yoy va elektron-nur pechlarida eritib, keyin deformatsiyalab olinadi. Yadro energetikasi, kosmonavtika, elektrotexnika, elektronika va boshqalarda ishlatiladi.

Volframning ikkita sulfidi bor:

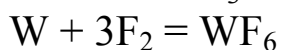
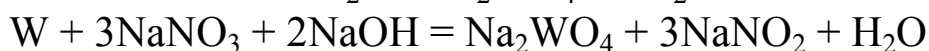
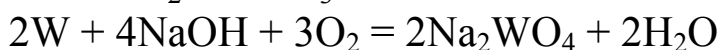
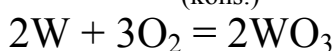
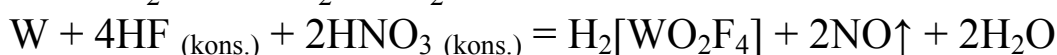
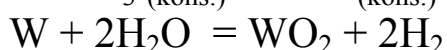
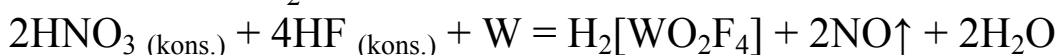
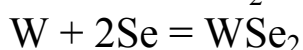
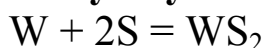
1) WS_2 to'q kulrang kristall modda, zichligi $7,5 \text{ g/sm}^3$, 1250°C da parchalanadi, tabiatda uchraydigan WS_3 minerali tungstenit deb ataladi;

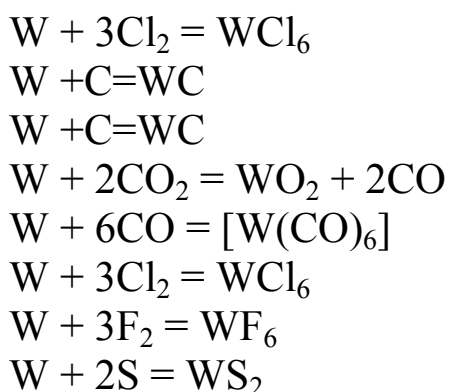
2) WS_3 qora kukun, suvda eriydi. Volfram qaytaruvchilari: vodorod, ko'mir, is gazi va boshqa moddalar kislorodli ba'zi birikmalardan kislorodni ajratib oladi, shuning uchun

ular qaytaruvchilar deb ataladi. Atom tuzilishi nazariyasiga ko'ra reaksiya vaqtida elektronlar berib, o'zi oksidlanuvchi, atom yoki ion qaytaruvchideyiladi.

Olinishi. Volframli rudalar tarkibida WO_3 55-65% bo'lgunga qadar gravitatsiya, flotatsiya yoki magnitli separatsiya usullari bilan boyitiladi. So'ng ikki xil usul bilan – volframli boyitma soda bilan kuydirilib yoki avtoklavda eritma yordamida qayta ishlanadi. Ikkinchi usuli boyitma kislotalar yordamida eritiladi. Olingan volframit natriy turli qo'shimchalardan tozalangach, HCl yordamida volfram kislotasi H_2WO_4 olinadi. $500-600^\circ\text{C}$ da toblash natijasida toza (III) oksid volfram olish mumkin. Paravolframit olish uchun esa ammiakli usul bilan unga qayta ishlov beriladi. Volfram (III) oksidi vodorod yordamida qaytarilib, ($700-900^\circ\text{C}$) sof volfram kukuni olinadi. Toza volfram metalini olish uchun olingan volframli kukunlar shtabik holatiga keltirish uchun zichlanadi. So'ng ular elektr nurlash usuli bilan eritib olinadi.

Kimyoviy xossalari:





Reniy – Re

RENIY: belgisi - Re. Reniy 1925-yilning iyun oyidanemis olimlari V.Noddak, I.Noddak va O.Berg tomonidan kashf etildi.

Davriy sistemaning VII guruh elementi (lot. Renum), tartib raqami 75, atom massasi 186,207. Reniy kumushrang-oq, qiyin eruvchan metall; zichligi 21,02, $t_{\text{suyuq}}=3180+20^{\circ}\text{C}$, $t_{\text{qayn}}=5600^{\circ}\text{C}$ chamasida. Geksagonal kristallik metall; 1869-yil D. I. Mendelejev VII guruhda marganesga o'xshash element borligini taxmin qilgan edi. Keyinchalik bu borada olimlar juda ko'p ish olib borishdi. 1922-yil nemis kimyogarlari Valter va Ida Noddaklar 75 tartib raqami ostida rentgen spektrida changli elementni aniqlashdi va 1925-yil Noddaklar yangi kimyoviy element kashf etganligini va uning nomi reniy deb atalganligini ma'lum qilishdi. Chet elda reniyni AQSh va Chili ko'p ishlab chiqaradi. O'rtacha yillik ko'rsatkich 10-15 tonnani tashkil etadi, xolos. MDH mamlakatlarida, xususan, O'zbekistonning Olmaliq hududida reniy ikkilamchi mahsulot sifatida, perranat ammoniy holida olinadi. U tarqoq sochma element bo'lganligi uchun ham yer qobig'ida 10-7% massa bo'yicha joylashgan. H_2SO_4 , HNO_3 da eriydi.

Minerallari. Reniy tabiatda tarqoq holda joylashganligi uchun ham minerallari juda kam. Keng tarqalgan bitta minerali juda mashhur bo'lib, bu jezkazganitdir – CuReS_4 . U ko'proq misli molibden rudalari tarkibida uchraydi. Aynan Olmaliq rudalari tarkibida u ushbu mineral holida uchraydi. Reniy, asosan, mis sulfidi va molibdenit minerallarida sochma holatda joylashgan bo'ladi. Shuningdek, u ko'proq xalkopirit, bornit, jezkazganit minerallari tarkibida uchraydi. Shuning uchun ham mis va molibden texnologiyasida reniy yo'ldosh sifatida ajratib olinadi.

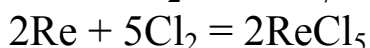
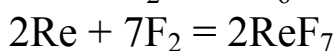
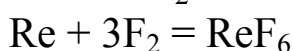
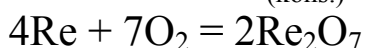
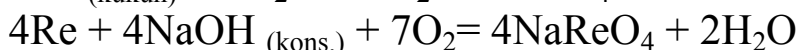
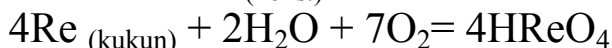
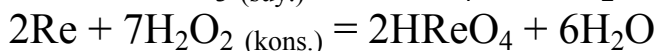
Ishlatilishi. Oddiy tarqoq element. Uning ishlatiladigan asosiy manbai mis-molibden, tantal bilan bo'lgan issiqbardosh, qiyin eriydigan qotishmalardir. Reniyning volfram, molibden, tantal bilan bo'lgan

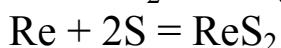
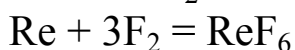
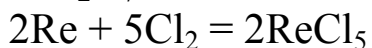
issiqbardosh, qiyin eriydigan qotishmalari tovushdan tez uchadigan samolyotlar va raketalarning detallarini tayyorlashda ishlatiladi. Reniy qoplamalari boshqa metallarni korroziya va yeyilishdan saqlashga xizmat qiladi. Reniy va uning birikmalari katalizator sifatida foydalaniladi. Kimyo va neft sanoati platinali katalizator o'rniga reniyli katalizatorlarning keng qo'llanilishi, ayniqsa, neftni kreking usuli bilan qayta ishlash paytida olingan benzinning nafaqat miqdorining oshishiga, balki uning oktant sonining oshishiga ham olib keladi. Reniyni bu sanoatda keng qo'llanilishi 5-6 barobarga toza benzinning ko'proq ishlab chiqilishiga olib keldi. Reniyni qattiq va yeyilmaslik xususiyati o'ta muhim, kichik pallali tarozilarning muvozanat ilgichlari, rentgen quvurchalari marksheyderiya va geodeziya priborlarining o'qi, shuningdek, ko'pgina olovbardosh va yuqori haroratga chidamli, o'ta qattiq detallar ishlab chiqarishda reniyli qotishmalar ishlatiladi.

Qotishmalari. Reniyni qotishmasi quyidagicha izohlangan: 2% Re, 50 - 90% W va Cr dan 30% Fe va Ni (yoki Co).

Olinishi. Reniy asosan molibden va mis boyitmalari tarkibida uchraydi. Molibdenni 5600-6000 °C da kuydirish jarayonida, Re_2O_7 va boshqa reniy oksidi gaz holatiga o'tadi (ajratib olish E - 90 - 95%), misli boyitmalarni eritish mobaynida 75% gacha reniy gaz holiga, qolganlari esa konverterlash paytida gaz holiga o'tib, sulfat kislotasi sexida suvli eritmaga o'tadi. Eritmadan sorbsiya, suyuq ekstraksiya, cho'ktirish usullari bilan perenat ammoniy olinadi. So'ng vodorod yordamida qaytarilib, reniyli kukun olinadi. Olmaliq sharoitida molibdenli sulfidli boyitma quvursimon aylana pechda kuydirilayotgan paytda gaz holatiga o'tadi va u sulfat kislotasi sexida ushlanib, ekstraksiya usuli bilan qayta ishlanib, perronat ammoniy olinadi.

Kimyoviy xossalari:





Osmiy – Os

OSMIY:belgisi - Os. (Osmium yunoncha hid demakdir), platinali metallar guruhiga kiruvchi kimyoviy element, (lot. Osmium), 1804-yilda angliyalik S.Tennant tomonidan kashf etilgan. Davriy sistemaning VIII guruh elementi, tartib raqami 76, atom massasi 190,2; ko‘kimsir-kulrang metall; zichligi 22,500 g/sm³, $t_{\text{suyuq}}=3030^{\circ}\text{C}$, $t_{\text{qayn}}=5000^{\circ}\text{C}$. Platina va boshqa platinali metallar bilan birga qazib olinadi. Osmiy va uning birikmalari turli jarayonlar (masalan, ammiakni sintezlash, gidrogenizatsiya)da yaxshi katalizatorlar hisoblanadi. OsO₄ oksidi o‘tkir hidli (nomi ham shundan).

Minerallari. Tabiatda osmiy iridiy guruhidagi minerallar ko‘rinishida, ba‘zan sof platina bilan birga uchraydi.

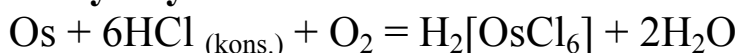
Ishlatilishi. Kislotalarda va zar suvida erimaydi, osmiy bilan iridiy qotishmasi nihoyatda qattiq bo‘lgani uchun soat mexanizmini tayyorlashda ishlatiladi. Osmiy va uning boshqa platinali metallar bilan tabiiy va sun‘iy qotishmalari (juda qattiqligi, korroziya va yeyilishga chidamliligi tufayli)

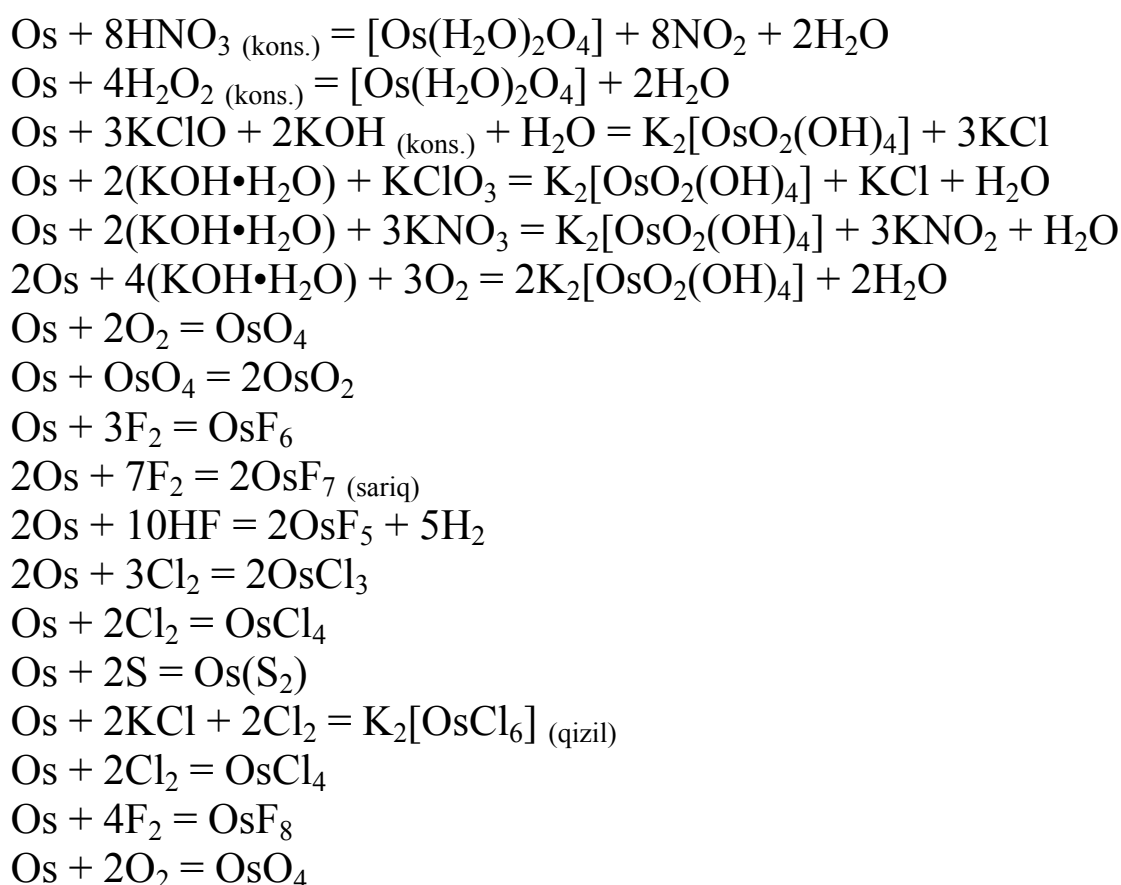
aniq o‘lchov asboblarining yeyiladigan detallari, avtoruchka perolarining uchki qismi va boshqalari tayyorlanadi.

Olinishi. Osmiy tarkibli rudaning 1 tonnasida osmiy miqdori, odatda, grammining o‘ndan bir ulushidan ortmaydi. Ruda bekorchi jinslar –qum, loydan yuvib tozalanadi. Hosil bo‘lgan mahsulot tarkibida 60-90% osmiy va ozroq boshqa platinaviy metallar aralashmasining tarkibi bo‘ladi. So‘ngra xom osmiyga zar suvi bilan ishlov beriladi, bundan noasl metallar oddiy xloridlar FeCl, CrCl₂, NiCl₂ va boshqa holda eritmaga o‘tadi, asl

metallar esa N₂[ECl₆] bu yerda E - Pt, J₂H₃[OsCl₆] turdagi kompleks hosil qiladi. Yuqori tozalikdagi metall olish uchun olingan osmiyni zar suvida eritib, qayta cho‘ktirilib, sof holda olinadi.

Kimyoviy xossalari:





Iridiy – Ir

IRIDIY:belgisi - Ir. 1804-yilda angliyalik S.Tennant tomonidan topilgan (Iridium - yunoncha “irius” -“kamalak” degan soʻzdan, tuzlari turli rangda boʻlgani uchun shunday atalgan) - platina metallar turkumidagi kimyoviy element, (lot. Iridium), davriy sistemaning VIII guruh elementi, tartib raqami 77, atom massasi 192,2; $t_{\text{suyuq}}=2447^{\circ}\text{C}$, $t_{\text{qayn}}=4577^{\circ}\text{C}$; zichligi 22,42 g/sm³; kumushrang-oq metall, suvda erimaydi, zar suvida va xlorli suvda oz eriydi. Tabiatda kam, asosan, yombi, platina tarkibiga kiruvchi osmiy iridiy koʻrinishida uchraydi.

Minerallari. Iridiy mis, nikel sulfidli ruda tarkibida boʻladi.

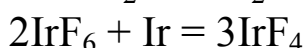
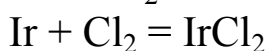
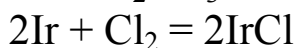
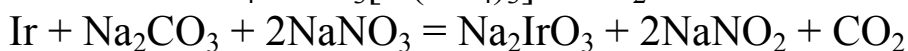
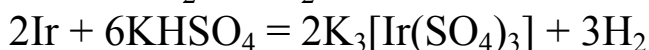
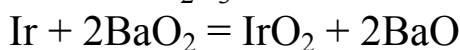
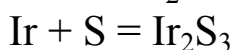
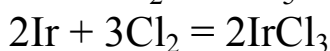
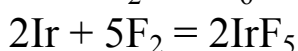
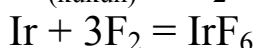
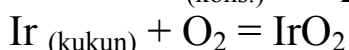
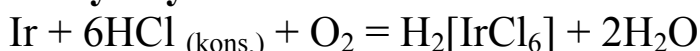
Ishlatilishi. Metallurgiya sanoatida xomaki mis shlamini elektrorafinirlash maqsadida ishlatiladi. Zargarlikda qimmatbaho toshlarni sayqallashda ishlatiladi.

Qotishmalari. Iridiy (volfram, platina, rodiy va boshqalar bilan qotishmalari) ning korroziya bardoshligi va olovbardoshligi yuqori boʻlganligi sababli kimyo apparatlari uchun qimmatbaho material hisoblanadi. Platina (90%) va iridiy (10%) qotishmasidan metr hamda kilogram etalonlari tayyorlangan. Qattiqligi va yoyilishga chidamliligi yuqori boʻlishi talab qilinadigan asboblarning qismlarida tabiatda

uchraydigan osmiyli iridiy (osmiridiy) dan foydalaniladi. Platina, palladiy, osmiy, elementlari bilan qotishmalari mavjud.

Olinishi. Iridiy uning birikmalarini platina metallarning eritmalaridan ion almashinish sorbsiyasi yoki uning birikmalarini tanlab choʻktirish bilan olinadi. Shuningdek, iridiy osmiy olinishi usulida qayta ishlanadi. Texnologik jarayon platina, osmiylarning sof holda olinishiga asoslanib, iridiy olinadi.

Kimyoviy xossalari:



Platina – Pt

PLATINA:belgisi - Pt. (Platinum, ispancha “Platinas” soʻzidan olingan boʻlib, kumush kabi degan maʼnoni bildiradi), (frans. plat - tekis), (lot. platinum); dielektrik plastina, davriy sistemaning VIII guruh kimyoviy elementi. 1803 yilda Volloston platinani toza holda olgan. Tartib raqami 78, atom massasi 195,09; kulrang-oq kubik kristallardan iborat metall; zichligi 21,450 g/sm³, $t_{\text{suyuq}}=1772^{\circ}\text{C}$, $t_{\text{qayn}}=3827^{\circ}\text{C}$; kimyoviy taʼsirlarga chidaydi; kimyoviy turgʻun (xona haroratida platinaga faqat “zar suvi” va brom taʼsir qiladi); zar suvida va suyuqlangan ishqorlarda eriydi; Platina qarshilik termometrlari va termoparalar (platinaning palladiy, rodiy, iridiy, ruteniy, osmiyli qotishmasidan), elektr kontaktlari va qizdirgichlari uchun foydalaniladi.

Platinalash 2 usulda oʻtkaziladi:

1. Metall buyumlarning korroziya bardoshligini, nur qaytarish xossalari, yoyilishga chidamliligini oshirish, shuningdek, kontakt elektr oʻtkazuvchanligining doimiyligini saqlash uchun ularning sirtiga elektro-

kimyoviy usulda yupqa (1-5 mkm) platina qatlamini qoplash. Platina maxsus laboratoriya va kimyo apparaturasi, elektrotexnika asboblarning detallari (mis va uning qotishmalaridan ishlangan kontaktlar), elektron razryad trubkalari uchun molibdenli similar tayyorlashda, zargarlik, soatsozlik sanoatida qo'llaniladi.

2. Katalizatorlar ishlab chiqarishda moddalar (asbest, glinozem)ning sirtiga kimyoviy usulda yupqa platina qatlami qoplash.

Minerallari. Toza platinaning tarkibiga, asosan, toza ferroplatina minerallari (massa ulushi: 77-81% Pt, 20-14% Fe) va poliksen (80-92% Pt, 10-6% Fe), qolgani ko'pincha plastinasimon metallar, shuningdek, mis va nikellar bo'ladi.

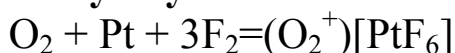
Ishlatilishi. Platina kimyoviy idishlar tayyorlash uchun va katalizator sifatida ishlatiladi. Platina nikel va mis shlam (kukunsimon chiqindi) laridan, boyitilgan sochma konlardan, temir-tersakka chiqarilgan texnika buyumlaridan olinadi. Korroziya bardosh, yuqori haroratga turg'un, bosim ostida yaxshi ishlanuvchanlik kabi muhim xossalarga egaligidan platina texnikaning barcha sohalarida ishlatiladi. Platina eng keng tarqalgan katalizatorlardan biri, xususan, oksidlanish reaksiyalari (SO₂ ni oksidlab, sulfat kislotasini sintezlash, NH₃ ni oksidlab, azot kislotasini sintezlash) da ishlatiladi. Platinaning ko'p qismi zargarlik buyumlari tayyorlashda ishlatiladi.

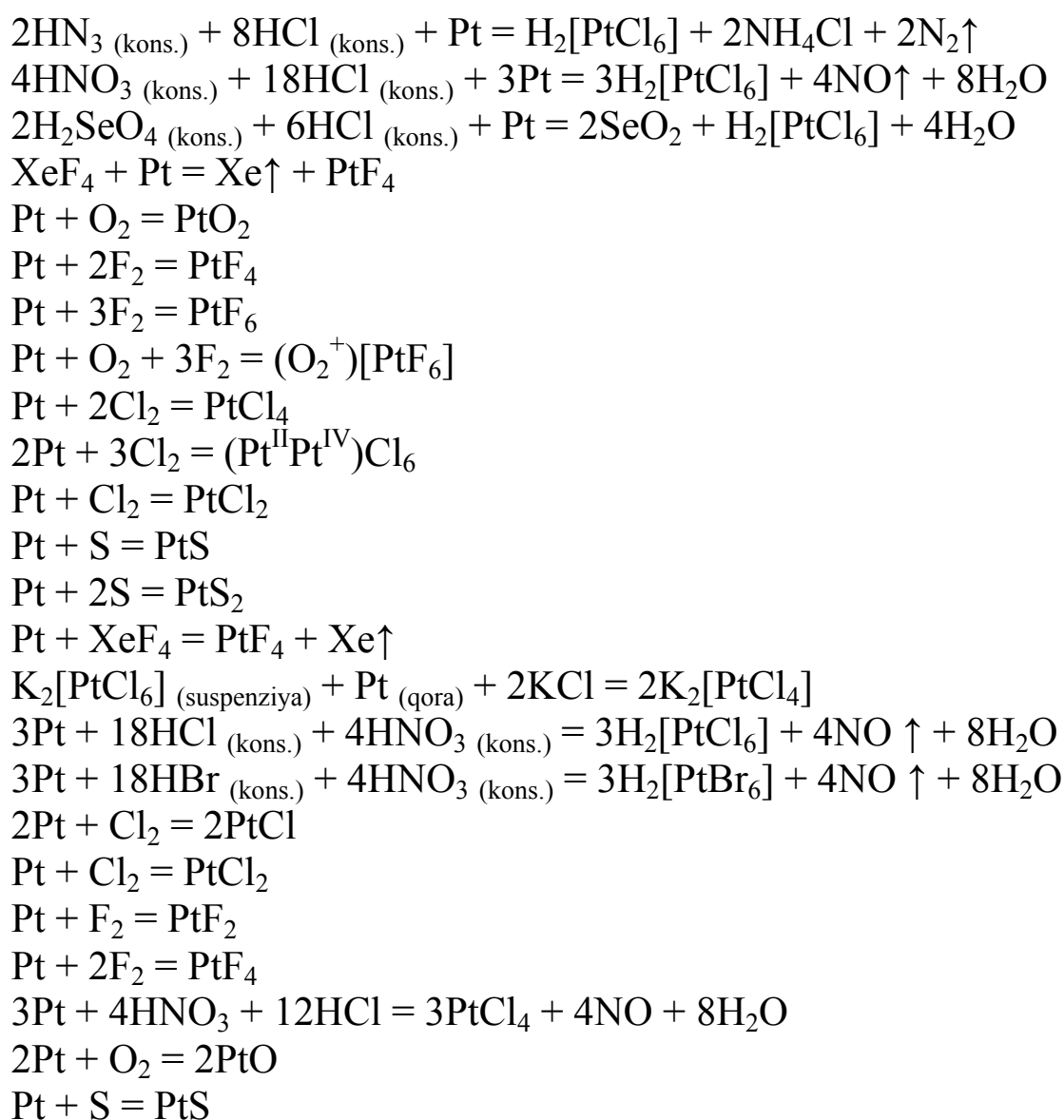
Qotishmalari. Tabiatda, asosan, toza va qotishmalar holida uchraydi. Platinaning boshqa asl metallar, ko'pincha rodiiy (40% gacha), palladiy (50% gacha), iridiiy, shuningdek, nikel, kobalt, xrom, volfram va molibdenli qotishmalari. Ko'pchilik yemiruvchi muhitlarda korroziya bardoshlik, mexanik xossalarining yuqoriligi, ko'p hollarda esa katalizator kabi ta'siri bilan xarakterlanadi. Qarshilik pechlarining qizdirgichlari, elektr kontaktlar, termoparalar uchun, kimyo va boshqa sanoat sohalarida olovbardosh va korroziya bardosh materiallar sifatida ishlatiladi. Platina va uning rodiiy hamda iridiiy qotishmalaridan kimyo sanoati apparatlari tayyorlanadi.

Olinishi. Platina guruhiga osmiy, iridiiy, palladiy elementlari kiradi. Platinaning olinishi osmiyni olish usuliga asoslangan. Bunda filtratda hosil bo'lgan (NH₄)₂[PtCl₆] kompleks holida bo'lib, ammoniy geksaxlor platinat-IV ni qizdirib platina olinadi.



Kimyoviy xossalari:





Oltin – Au

OLTIN: belgisi - Au. (Aurum - lotincha “aurora” shafaq so‘zidan), davriy sistemaning I guruh kimyoviy elementi, tartib raqami 79, atom massasi 196,967, tabiatda erkin holda uchraydi; kub shaklidagi kristallardan iborat, yaltiroq sariq rangli, og‘ir, yumshoq va juda plastik metall; zichligi $19,299 \text{ g/cm}^3$, $t_{\text{suyuq}}=1064^{\circ}\text{C}$, $t_{\text{qayn}}=2947^{\circ}\text{C}$.

Kislotalarda erimaydi, faqat zar suvida va KSN da eriydi. Kimyoviy jihatdan oltin boshqa asl metallar kabi juda inert. Tabiatda, asosan, sof holda uchraydi. Asosiy oltin koni ham, uning sochma konlari ham (asosiy konlarda oltinning mayda zarralari qattiq tog‘ jinslari orasida bo‘ladi; ular buzilganda oltinni qum va loylar bilan birga suv daryolar o‘zanlariga olib ketib, u yerda sochma konlar hosil bo‘ladi) sanoat ahamiyatiga ega.

Oltinni ajratib olishda amalgamatsiya, sianlash va ion almashinish sorbsiyalari jarayonlari katta ahamiyatga ega. Oltinning miqdori proba bilan ifodalanadi; odatda, mis qo‘shilma bo‘lib xizmat qiladi. Tovar ishlab chiqarishsharoitida oltin barcha tovarlar narxining umumiy ekvivalenti vazifasinibajaradi. Xalq tilida tilla deb ham yuritiladi. Oltin yugurtirish (zolocheniye) - buyumlar sirtiga yupqa (mkm ning ulushlaridan bir necha nmkm gacha) oltin qoplash; bunda buyum bezaladi, himoyalaniadi yoki ham himoyalaniib, ham bezaladi.

Minerallari. Oltin juda yaxshi elektr o‘tkazuvchandir. Elektr o‘tkazuvchanligi 99,95 (kumush uchun 100). Kumush dahandam alangasida eriydi. Uning HNO_3 dagi eritmasi HCl qo‘shganda oq suzmaga o‘xshash cho‘kindi - AgCl beradi. Kumush H_2S ta‘sirida qorayadi. Oltin kimyoviy toza holda tabiatda nihoyatda kam uchraydi. Sof toza deb ataladigan oltin tarkibida ko‘pincha kumushning izomorf aralashmasi (og‘irligiga ko‘ra 4 % dan 15 % gacha) bo‘ladi. Kumushga boyroq xili ham uchraydi, u alohida mineral turiga kiradi. Oltinning xillari qatoriga quyidagilar kiradi: misli oltin (kuproaurit) tarkibida mis 20 foizgacha (og‘irligiga ko‘ra); popetsit-palladiyli oltin tarkibida qo‘rg‘oshin 5 foizdan 11 foizgacha, vismutli oltin (vismutoaurit) tarkibida vismut qattiq eritma holda bo‘lib, 4 foizgacha yetadi. Sof toza oltinning rangi tilla-sariq (kumushga boy xillari och sariq) bo‘ladi. Chizig‘imetallarnikiga o‘xshash, sariqdir. Qattiqligi 2,5-3,0. Oltin egiluvchan va cho‘ziluvchandir. Oltinning ulanish tekisligi bo‘lmaydi. Solishtirma og‘irligi 15,6-18,3 (sof oltinniki 19,30). U tezdandan boshqa kislotalarda erimaydi; KCN erkin xlor va brom ajraladigan reaktivlarda eriydi. Oltinning eng ko‘p massasi genetik jihatidan nordon magmatik jins intruzivlari bilan bog‘liq bo‘lgan tipik gidrotermal konlarda tarqalgan. U ko‘pincha kvarts va sulfidlar (pirit, arsenopirit, aynama rudalar, xalkopirit, kamroq galenit, sfalerit), ba‘zan oltin ham kumush telluridlari va boshqa minerallar bilan bir paragenezisda uchraydi. Oddiy ko‘z bilan ko‘rish mumkin bo‘lgan oltin qonuniy ravishda paydo bo‘lib, ozidan oldin hosil bo‘lgan minerallar yoriqlarida topilishi juda ham xarakterlidir. Ko‘zga ko‘rinmaydigan “bog‘langan” oltin ham bor. Bu sulfidlar, asosan, pirit va arsenopirit (FeAsS) tarkibida anchagina miqdorda bo‘lib, kimyoviy tahlillar yordamida aniqlanadi. Sof toza oltin sulfid konlarning oksidlanish hududida limonit, azurit va qo‘rg‘oshin, vismut, surma va boshqa metallar oxralari bilan bir assotsiatsiyada qayta paydo bo‘lgan mahsulot sifatida uchraydi. Oltin tarkibidagi kumushning yer yuzasidagi nurash sharoitlarida qisman yuvilib ketishi kon atrofida va jins yoriq

darzlarida bo‘lgan oltinning ancha tozalanib qolishiga sababchi bo‘lishi ham ma‘lumdir.

Amaliy ahamiyati. Ma‘lumki, oltin asosiy pul va valyuta metalidir. U bezak ishlarida, zeb-ziynat buyumlarini tayyorlashda, fizik va kimyoviy asboblarda ishlatiladi. Sanoatbop tur rudalar tarkibida oltin 1 g/t bilan 10 g/t orasida, ya‘ni 0,0001 foizdan 0,001 foizgacha (konning hajmi ham o‘zlashtirishning iqtisodiy sharoitlariga qarab) bo‘ladi.

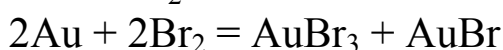
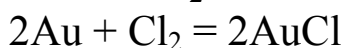
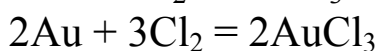
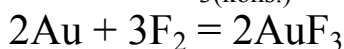
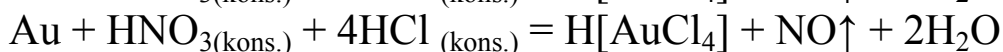
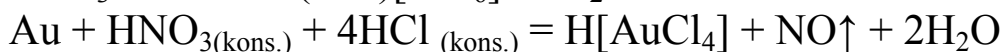
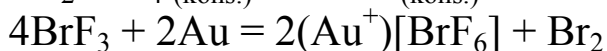
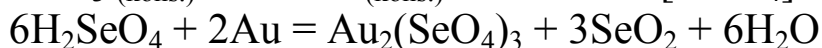
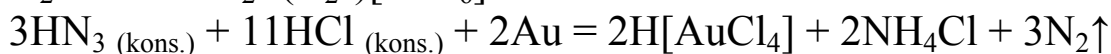
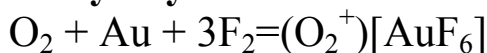
Ishlatilishi. Texnikada oltin boshqa metallar bilan qotishmalar holida ishlatiladi; bu esa oltinning mustahkamligini oshiradi hamda uni tejashga imkon beradi. Zargarlik buyumlari, tangalar, medallar, tish protezlash korxonasiining yarim fabrikatlarida ishlatiladi. Oltinning platinali qotishmasi kimyoviy turg‘un apparaturalar ishlab chiqarishda, platinali va kumushli qotishmasi esa elektrotexnikada ishlatiladi.

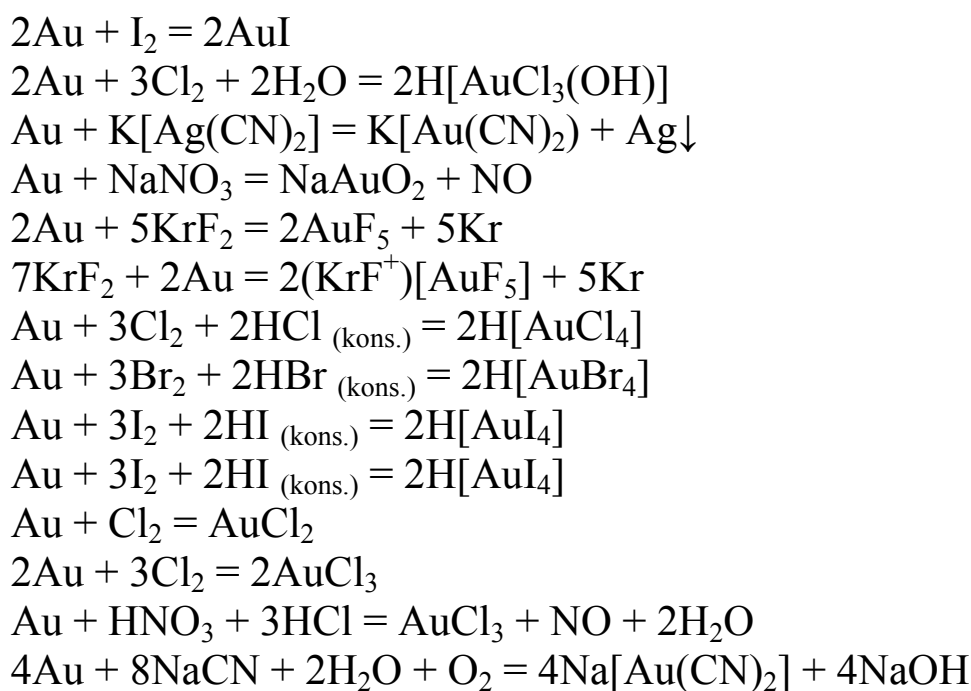
Qotishmalari. Oltinning rangli metallar bilan qotishmasi pishiqligi jihatdan yuqori turadi.

Olinishi. Oltin rudalarni olish uchun, avvalo, u maydalangach, cho‘ktiruvchi mashina, shlyuzlar, konsentratsion stollar, konusli gidrotsiklonlar yordamida boyitiladi. Oltinning tarkibi 100 dan 500 gGt gacha bo‘ladi, so‘ng sianid yordamida kislorod bilan u eritmaga o‘tkaziladi. Rux yordamida eritmaga cho‘ktirib olinadi. Affinaj 2-bosqichda o‘tkazilib, 1-bosqichda elektroliz vanna yordamida kumush affinaji o‘tkaziladi. Keyin esa oltinli shlam elektrolizdan so‘ng azot kislotasi bilan qayta ishlanib eritiladi va toza oltin quyma shaklida olinadi.

Sof toza oltin quymasi qoliplarga quyiladi va tayyor bo‘lgan 99,99% li oltinning granulalangan va eksport uchun tayyorlangan quyma shakli sotuvga chiqariladi.

Kimyoviy xossalari:





Simob - Hg

SIMOB: belgisi - Hg. Kimyoviy element, Ng (lot. Hydrargyrum, yunon. hydros - suv va arguros - kumush), davriy sistemaning II guruh elementi; kumushday oq suyuq metall. Qadimdan ma'lum; tartib raqami 80, atom massasi 200,59, (oddiy haroratda yagona suyuq metall); zichligi 13,520 g/sm³, $t_{\text{suyuq}}=38,89^{\circ}\text{C}$; (barcha ma'lum suyuqliklar ichida eng og'iri), $t_{\text{qayn}}=357,25^{\circ}\text{C}$, suvda va HCl da erimaydi, HNO₃ da eriydi; bug'iva birikmalari zaharli. Deyarli barcha metallar simobda amalgama hosil qilib eriydi. Qattiq simob 1759-yilda Peterburgda M.P.Braun va M.V.Lomonosovlar tomonidan olingan.

Minerallari. Minerallari ichida eng muhimi kinovar HgSC tarkibida HgS bo'lgan rudalar yoki konsentratlardan olinadi.

Ishlatilishi. Toza simob havoda oksidlanmaydi; bo'yoqlar, portlovchi moddalar, termometrlar tayyorlashda va tibbiyotda, oltin sanoatida, fizika va kimyo laboratoriyalarida ishlatiladi. To'g'rilagichlarda, kunduzgi yorug'lik lampalari, kvarsli simob lampalar, manometrlar tayyorlashda, oltinni ajratib olishda keng qo'llaniladi.

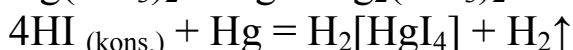
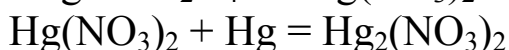
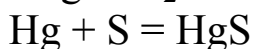
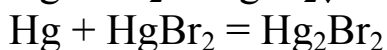
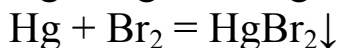
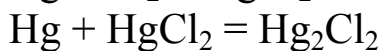
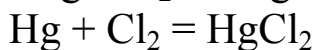
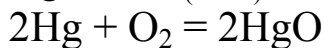
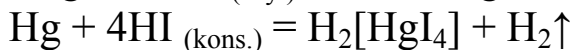
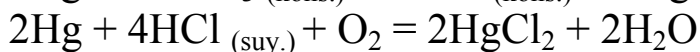
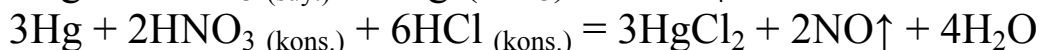
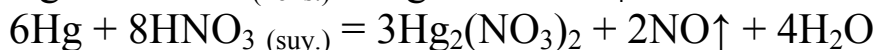
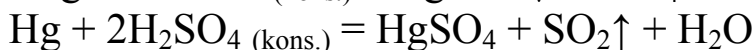
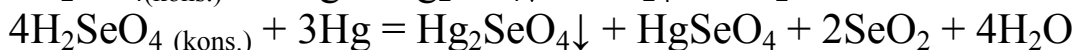
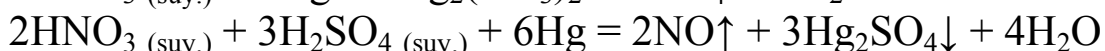
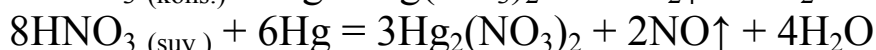
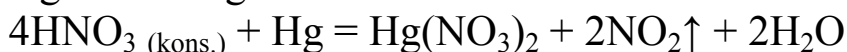
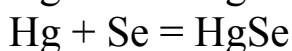
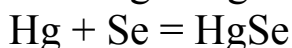
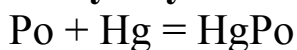
Qotishmalari. Simob sanoatda amalgama shaklida tayyorlanadi: Na₂[HgS₂].

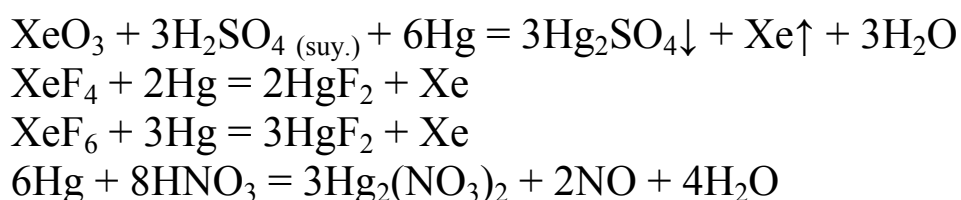
Olinishi . Simobli rudalar juda kambag'al bo'lib, 0,1% asosiy metallni tashkil etsada, aylana quvurlarda 200-400⁰C da bug'lantiriladi. Deyarli, simob bug' holatida sovutilib, gaz simob suyuqlanadi. Simobga boy bo'tana (pulpa) – stuppa - qozonga ohak bilan qo'shib qoriladi.

Ohak deyarli suvni o'zida ishlab olib, suvsizlantiradi. Qozon ostidagi simob alohida ustki qismidagi birikma qaytadan kuydirishga jo'natiladi. Simob rafinirlanib tozalanadi va sof simob olinadi. Tozalash usullari juda xilma-xil bo'lib, distillangan suv, natriy kislotasi yordamida olinsa, o'ta sof toza simob olish uchun esa vakuumda distillyatsiya usuli orqali bug'lantiriladi. Shuningdek, texnikada pirometallurgiya usuli bilan HgS dan olinadi.

Buning uchun simob rudasi kislorod ta'sirida kuydiriladi. Natijada, hosil bo'lgan HgS termik beqaror bo'lgani uchun u erkin simobga parchalanib ketadi. Bug' holda hosil bo'lgan simob maxsus idishga yig'ilib, keyin haydash yo'li bilan tozalanadi. Simobni olishda ba'zan HgS ga temir yoki kalsiy ta'sir ettirib olish mumkin.

Kimyoviy xossalari:





Talliy – Tl

TALLIY:belgisi - Tl. (lot. Thallium), (yunon. thallos – u 1861-yilda ingliz fizigi Kruks tomonidan spektr analiz orqali topilgan va yashil shox spektrning och yashil chiziqlariga ko‘ra shunday ataladi) - davriy sistemaning III guruh elementi, tartib raqami 81, atom massasi 204,38. Talliy – ko‘kish-oq rangli yumshoq metall, zichligi 11,850 g/sm³; $t_{\text{suyuq}}=303^0\text{C}$, $t_{\text{qayn}}=1457^0\text{C}$. Yer yuzida 3·10-4 % joylashgan.

Minerallari. Uning bir qancha minerallari mavjud, biroq u sochma holda uchragani uchun ham ko‘proq qo‘rg‘oshin, mis, rux, temir minerallari tarkibida uchraydi.

Ishlatilishi. Talliy karbonat Tl_2CO_3 yorug‘lik nurini kuchli sindiradigan shishalar ishlab chiqarish uchun, talliy sulfat $\text{Tl}_2(\text{SO}_4)_3$, qishloq xo‘jaligida kemiruvchilarga qarshi kurashishda ishlatiladi (talliyning barcha birikmalari juda zaharli), tibbiyotda ishlatiladi. Keng ko‘lamda bo‘lmasa ham, har holda, talliy turli-tuman maqsadlarda ishlatiladi. Uning birikmalaridan optik, lyuminessent va fotoelektr asboblari uchun materiallar ishlab chiqarishda foydalaniladi. Talliy sulfati zaharli ximikat sifatida qishloq xo‘jaligida foydalaniladi.

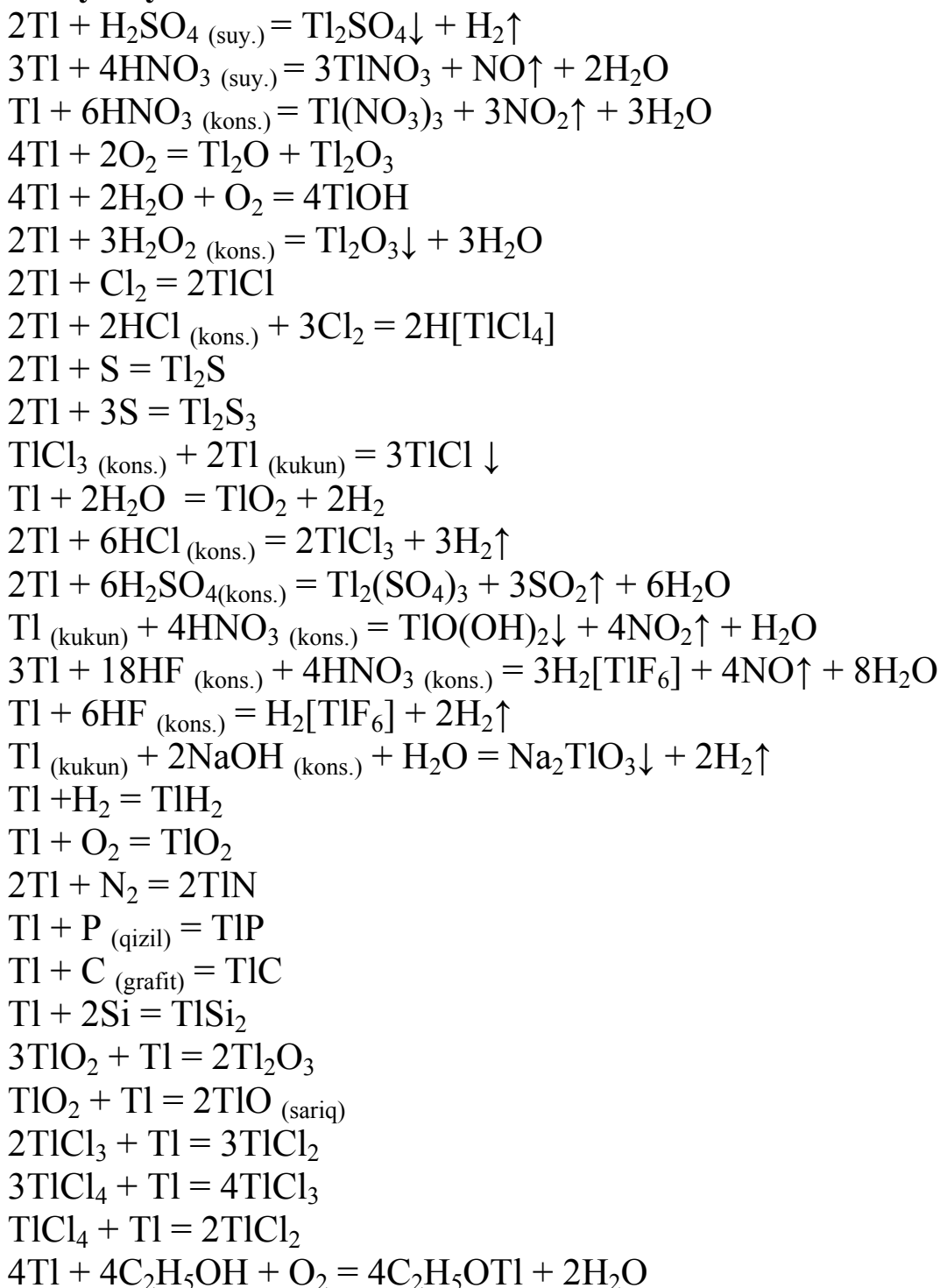
Qotishmalari. Talliy, asosan, qalay va qo‘rg‘oshinli kislotabardosh, podshipnikbop va boshqa qotishmalar tarkibiga kiradi. Qotishmalari kislotalarga chidamli. Talliy qo‘rg‘oshin asosli podshipnik qotishma tarkibiga kiradi. Masalan, 72% - Pb, 15% - Sb, 5% - Sn, 8% -Tl. Qo‘rg‘oshin qotishmalarini talliy bilan ligirlash ularning korroziyaga mustaqamligini oshiradi. 70% - Pb, 20% - Sn, 10%-Ti HCl va azot kislotasiga chidamli. Qattiq jismlarni zichlik bo‘yicha ajratadi, shulardan minerallarda, og‘ir suyuqliklarda foydalaniladi – molonat suvli eritmali va talliy formiati (klerich suyuqligi), shuningdek, talliyning yengil eruvchi tuzlari $\text{TlAg}(\text{NO}_3)_3$, $\text{TlHg}(\text{NO}_3)_2$ mavjud.

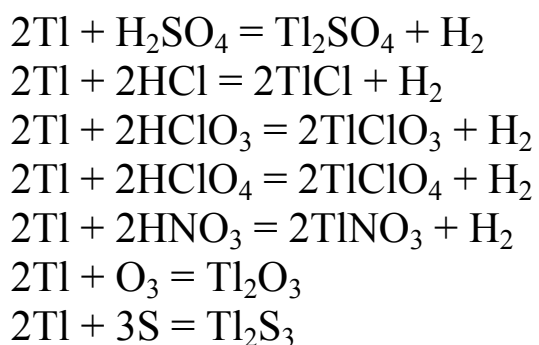
Olinishi. Talliy olish uchun asosiy xomashyo manbai bu og‘ir rangli metallar ajratib olish sanoatining ikkilamchi mahsulotlari, changi va texnogen chiqindilari hisoblanadi. Xususan, mis, rux, qo‘rg‘oshin ishlab chiqarish sanoatidan chiqayotgan oqava va texnologik gazlar tarkibida changda uchraydi va u sulfat kislotasi sexida ushlanadi. Ba’zida rux

elektrolitini tozalash paytida olinadigan misli kadmiy kek ham xomashyo manbai bo‘la oladi. Ushbu mahsulotlar va chiqindilar tarkibida 0,01% dan 0,15 gacha talliy uchraydi. Metall hoida talliy uch xil usulda olinadi:

- 1) karbonat sulfat va perxloratorlarning elektrolizi orqali;
- 2) eritmadan rux orqali sementatsiya yo‘li bilan cho‘ktiriladi;
- 3) talliy xloridi yoki oksaliti qaytaruvchi birikmalar yordamida qaytariladi. Talliy bimalol pichoq bilan qirqsa bo‘ladi.

Kimyoviy xossalari:





Qo'rg'oshin - Pb

QO'RG'OSHIN: belgisi - Pb. Davriy sistemaning IV guruh kimyoviy elementi, Pb. (lot. Plumbum), tartib raqami 82, atom massasi 207,2. Qo'rg'oshin ko'kimtir-kulrang, bolg'alanuvchan yumshoq metall, zichligi 11,340 g/sm³, $t_{\text{suyuq}}=327,4^{\circ}\text{C}$, $t_{\text{qayn}}=1745^{\circ}\text{C}$; qo'rg'oshin havoda oksidlanib, qorayadi va gidroksi-karbonat bilan qoplanib qoladi; konsentrlangan ishqorlarda eriydi, sulfat va xlorid kislotalarga yuzaki ta'sir etib, qo'rg'oshin sirtini suvda erimaydigan Pb₂O₄ - PbCl₂ bilan qoplab turadi. Dunyo miqyosida yiliga o'rtacha 2 mln. tonnadan ortiq qo'rg'oshin eritib olinadi.

Qo'rg'oshinlash – metall buyumlarni korroziyadan saqlash maqsadida ularga qo'rg'oshin qo'shimcha qilish. Buyumlar eritilgan qo'rg'oshinga botiriladi, metallashda galvanik va boshqa usullardan foydalaniladi.

Minerallari. Asosiy minerali – qo'rg'oshin yaltirog'iyoki galenit. Sanoatda tarkibida qo'rg'oshin bo'lgan sulfidli ruda avval flotatsiyalab boyitiladi, keyin koks va ohaktosh solingan pechda qizdiriladi, hosil bo'lgan qo'rg'oshin elektroliz usulida tozalanadi.

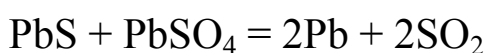
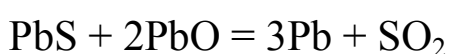
Ishlatilishi. Qo'rg'oshindan kimyo zavodlarining apparaturalari, akkumulyator plastinkalari, babbittlar, chochmalar tayyorlanadi. Qo'rg'oshin radioaktiv nurlanishdan himoyalashda ishlatiladigan asosiy xomashyodir.

Uning birikmalari turli sohalarda: tetraetil-qo'rg'oshin antidetonatori, har xil bo'yoqlar – qizil surik Pb₂O₄, sariq glet PbO, qo'rg'oshinli oq bo'yoqlar 2PbCO₃·Rb(ON)₂, qo'rg'oshin sulfid RbS - yarim o'tkazgichlar tayyorlashda qo'llaniladi. Eritib olingan qo'rg'oshinning asosiy qismi akkumulyatorlar plastinalari tayyorlash uchun ishlatiladi. Qo'rg'oshindan, korroziyaga chidamliligi tufayli, kimyoviy apparaturalar (asosan, sulfat kislota ishlab chiqarishda), elektr kabeli qoplamasi va boshqalar

tayyorlashda foydalaniladi.

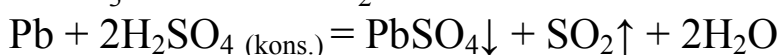
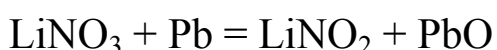
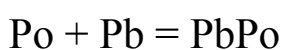
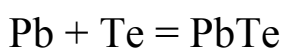
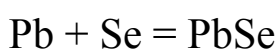
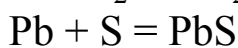
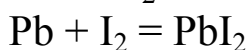
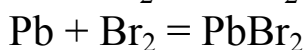
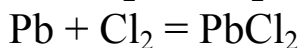
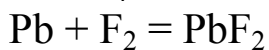
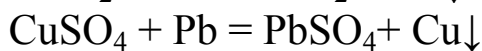
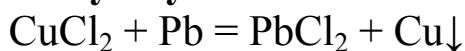
Qotishmalari – qalay, surma, mis va boshqa metallar qo‘shilgan qo‘rg‘oshin asosida tayyorlanadi. Uncha qattiq emas, suyuqlanish harorati past, zichligi katta, yaxshi texnologik va antifraksion xususiyatga ega, korroziyabardoshligi yuqori. Podshipnik materiallari, bosmaxonada va boshqa oson eruvchi qotishmalar sifatida, pitra, kabel qoplamalari uchun ishlatiladi.

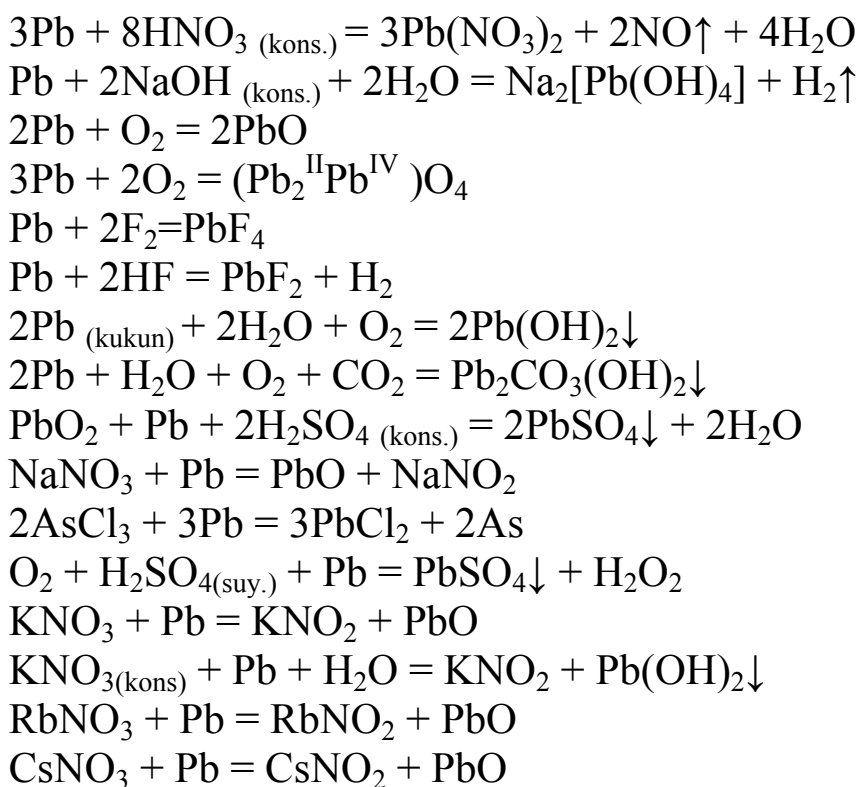
Olinishi. Qo‘rg‘oshinli rudalar flotatsiya usuli bilan boyitilgach, ohaktosh yordamida aglomeratsiya mashinasida kuydiriladi, so‘ng eritilib, tozalanadi. Shuningdek, aglomerat minerali pechlarda koks yordamida eritilib, xomaki qo‘rg‘oshin olinadi. Qo‘rg‘oshin asosan sulfidli rudalar tarkibida 0,5 dan 8% gacha bo‘lib, flotatsiya usuli bilan boyitiladi. Uning tarkibida qo‘rg‘oshin 40-70% bo‘ladi. So‘ng aglomeratsion kuydirish yordamida (750-1000⁰C) aglomerat olinib, shixta tayyorlanadi va mineral eritish pechida koks yordamida qo‘rg‘oshin oksidi qaytarilib, xomaki qo‘rg‘oshin olinadi. Agar boyitma tarkibida qo‘rg‘oshin 65% dan ortiq bo‘lsa, boyitma to‘g‘ridan-to‘g‘ri reaksiyon eritish usuli bilan xomaki qo‘rg‘oshin olinadi. Ya‘ni,



Xomaki qo‘rg‘oshin pirometallurgiya usuli bilan barcha qo‘shimchalardan tozalash orqali tozalanadi va sof qo‘rg‘oshin olinadi.

Kimyoviy xossalari:





Vismut –Vi

VISMUT: belgisi - Bi. Uni XV asrda Vasiliy Valentin topgan; (nem. Wismut) davriy sistemaning V guruh kimyoviy elementi, tartib raqami 83, atom massasi 208,9804. Vismut – pushti - kumushrang metall; zichligi 9,84 g/sm³, t_{suyuq}=271⁰C, t_{qayn}=1557⁰C. Vismut 1739-yil I.Pott tomonidan kashf etilgan. Yer qobig'ida 2·10⁻⁵ % ni tashkil etadi. Tabiatda bitta barqaror izotopi mavjud. Chet ellarda o'rtacha yiliga 4000 tonnadan ortiq vismut ishlab chiqariladi.

Minerallari. Vismutning och sarg'ish-qizil tusda tovlanishi, metall kabi o'tkir yaltirashi, mukammal ulanish tekisligi, yumshoqligi va nisbiy katta solishtirma og'irligiga qarab oson belgilanadi. Dahandam alangasida oson eriydi, uzoq vaqt qizdirganda ko'mir ustida gard qoldirib, bug'ga aylanib ketadi. Gardi avval oq, keyinchalik sarg'ish-qizil, sovuganda esa limon-sariq rangga kiradi. KJ va S bilan qo'shib qizdirganda, ko'mir ustida o'ziga xos och qizil gard BiJ₃ (Bi aniqlanadigan reaksiya) hosil qiladi. HNO₃ da oson eriydi; eritma suyultirilgandan keyin oq cho'kma cho'kadi.

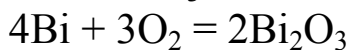
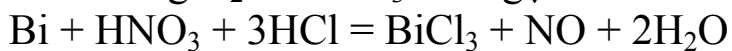
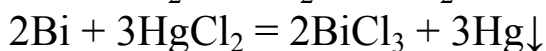
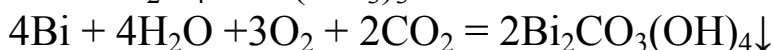
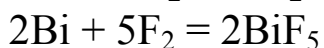
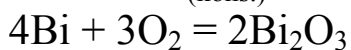
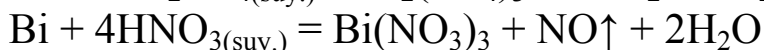
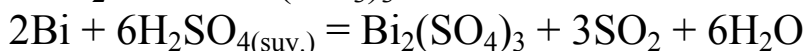
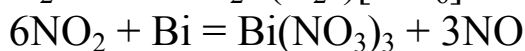
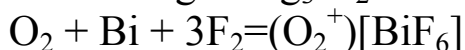
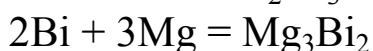
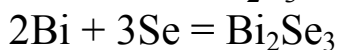
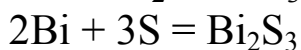
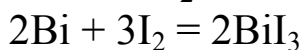
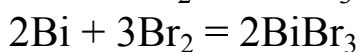
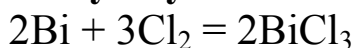
Ishlatilishi. Vismutning oson eriydigan qotishmalari yong'inga qarshi avtomatik qurilmalarda, kavshar sifatida, yasama tishlar tayyorlashda ishlatiladi. Vismutdan magnit maydoni kuchlanganligini o'lchaydigan

asboblarning spirallari yasaladi. Vismut preparatlari (vikalin, vikair, kseroform, biyoxinol va boshqalar) tibbiyotda qoʻllaniladi.

Qotishmasi. Vismut-qoʻrgʻoshin, vismut-mis tarkibli qotishmalari sanoatda keng ishlatiladi.

Olinishi. Asosan, qoʻrgʻoshin rudalarini qayta ishlashda ikkilamchi mahsulot sifatida vismut ajratib olinadi. Vismutli birikma NaOH yordamida eritilib, elektroliz yordamida xomaki vismut ajratiladi, soʻng u gidrometallurgiya usuli bilan tozalanadi, ya'ni xlrlash, yodlash yoki vakuumda distillyatsiya usullari qoʻllaniladi.

Kimyoviy xossalari:



Poloniy – Po

POLONIY: belgisi - Po. 1898-yilda Kyurilar uran rudasini topganlar va Polsha shahri sharafiga shu nom bilan ataganlar. Davriy sistemaning VI guruh kimyoviy elementi (lot. Polonium), kimyoviy radioaktiv element, tartib raqami 84, atom massasi (210), uranning radioaktiv qatoriga kiradi. Eng uzoq yashovchi izotopi sun'iy olingan Po^{209} Po (T1/2 = 103 y.). Yer

qobig'ida 2·10-14% ni tashkil etadi. Zichligi 9,4 g/sm³, t_{suyuq}=254⁰C, t_{qayn}=962⁰C.

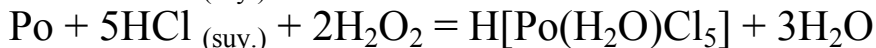
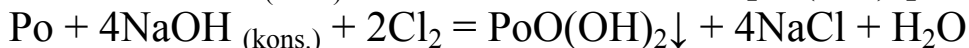
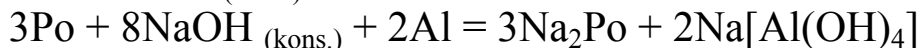
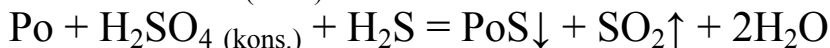
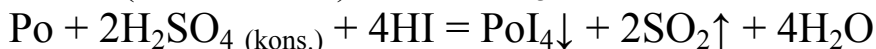
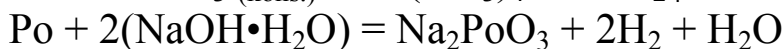
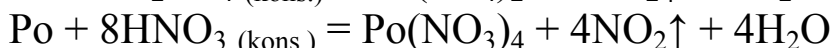
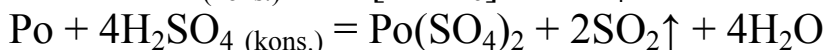
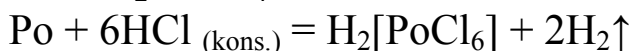
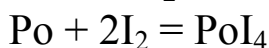
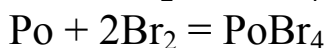
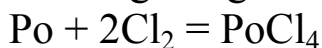
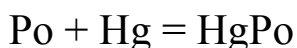
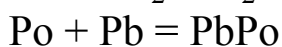
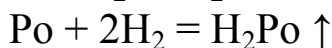
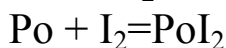
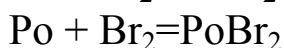
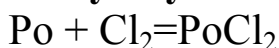
Minerallari. Uran rudasi tarkibida uchraydi.

Ishlatilishi. Uranning radioaktiv qatorida hosil bo'ladigan tabiiy izotopi ²¹⁰Po (T1/2=138,4 sutka) amaliy ahamiyatga ega. Poloniy uran rudalaridan olinadi. ²¹⁰Po nurlanish manbai sifatida qo'llaniladi; ²¹⁰Po ning berilliy bilan aralashmalari neytronlarning qulay manbai bo'lib xizmat qiladi, undan, xususan, turli materiallar tarkibini analiz qilishda foydalaniladi.

Qotishmalari. Izotop holida uran bilan birikmalari mavjud.

Olinishi. Poloniy radioaktiv element, juda oz miqdorda uran tarkibli minerallarda bo'ladi. Poloniyning 20 dan ortiq radioaktiv izotoplari sun'iy ravishda olingan.

Kimyoviy xossalari:



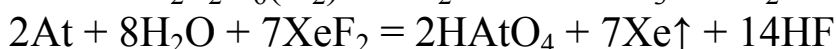
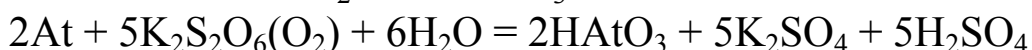
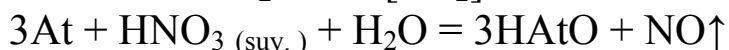
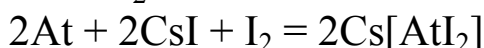
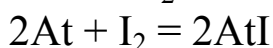
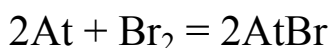
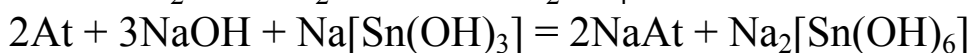
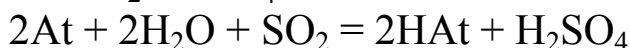
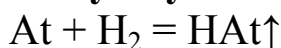
Astat – At

ASTAT: belgisi - At. (“astatos” - yunon tilida “mustahkam emas”), 1940-yil T.Korson, U.Makkenzi va E.Segrelar tomonidan sun'iy ravishda olingan. Davriy sistemaning VII guruh elementi, galogenlarga oid qatorda joylashgan; tartib raqami 85, atom massasi 210. Astat sun'iy radioaktiv element, $t_{\text{suyuq}}=300^{\circ}\text{C}$, $t_{\text{qayn}}=334^{\circ}\text{C}$. Oksidlanish darajasi -1, +1, +5 va +7 ga teng. Kimyoviy xossalari poloniy va vismut elementlariga yaqin. Radioaktiv elementlarning zanjirli reaksiyalarida ishlatiladi.

Minerallari. Yer qobig'ining 1,6 km qalinligida radioaktiv elementlar holida uchraydi. Bu minerallar tarkibida 70 mgr. ga yaqin astat bo'ladi.

Ishlatilishi. Hozirda amalda astat faqat radiokimyoviy tadqiqotlarda ishlatiladi. Olinishi. Vismut yoki toriy elementlari I-elektron zarrachalari bilan faollantiriladi. Bu jarayon yuqori haroratda boradi, so'ngra cho'ktirilgan eritma ekstraksiyalanadi va xromotografiya usulida tozalanadi. Modda distillangan suv bilan vismut atomlarini geliy yadrosi ishtirokida bombardimon qilib olinadi. Astatning yigirmaga yaqin izotoplari sintez qilingan, eng uzoq yashaydigan ^{200}At dir.

Kimyoviy xossalari:



Radon – Rn

RADON: belgisi - Rn. 1899-yilda ingliz olimlari E.Rezerford va R.Ouens radonning birinchi izotopini (Tn) olishdi. Shu yil eng og'ir inert gazining ochilish vaqti deb hisoblandi. 1900 yilda Rn (rodon), 1902-yilda

esa An (aktinon) olindi. (Tn va An - radonning izotoplari). Davriy sistemaning VIII guruh kimyoviy elementi, (lot. Radonum), tartib raqami 86, atom molekulasi $-[222]$,. Radon – radioaktiv, rangsiz, hidsiz inert gaz, zichligi $9,9 \text{ g/sm}^3$, $t_{\text{suyuq}}=-71^{\circ}\text{C}$, $t_{\text{qayn}}=-62^{\circ}\text{C}$; suvda eriydi, uranning radioaktiv yemirilishidan hosil bo‘ladi. Inert gazlar guruhiga kiradigan kimyoviy radioaktiv element. ^{222}Rn izotopi radiy ^{224}Ra parchalanganida hosil bo‘ladi (nomi shundan).

Minerallari. Radon radioaktiv element bo‘lib, tabiiy shifobaxsh suvlar tarkibida uchraydi.

Ishlatilishi. Ilmiy tadqiqot ishlari va tibbiyot (radon vannalari)da ishlatiladi.

Qotishmasi. Tish protezi ishlab chiqarishda ba'zi bir elementlar bilan aralashmasi ishlatiladi.

Olinishi. Shifobaxsh suvlarning elektr zaryadi yoyi orqali ionlashgan radon olinadi. Radon radioaktivlik xossasiga ega bo‘lib, izotoplari mavjud.

Kimyoviy xossalari:



Fransiy – Fr

FRANSIY: belgisi - Fr. Davriy sistemaning I guruh elementi, radioaktiv kimyoviy element, tartib raqami 87, kamyob va tabiatda uchraydigan barcha radioaktiv elementlar ichida barqarorligi eng kichik. Uning yagona tabiiy izotopi ^{223}Fr bo‘lib, yarim yemirilish davri $T_{1/2}=22$ min. Fr ning barcha xossalari juda oz miqdorda o‘rganilgan; zichligi $2,44 \text{ g/sm}^3$, $t_{\text{suyuq}}=26,84^{\circ}\text{C}$, $t_{\text{qayn}}=677^{\circ}\text{C}$. Kimyoviy xossalari bo‘yicha fransiy barcha ishqoriy metallar ichida eng faoli. Element kashfiyotchisi M.Pere fransiyalik bo‘lganligi uchun ham o‘z vatani – Fransiya nomi bilan atagan. Uning 20 dan ortiq izotoplari (203-229) mavjud bo‘lib, barchasi sun'iy yo‘l bilan olingan.

Minerallari. Fransiy tabiatda uran tarkibli minerallarda uchraydi.

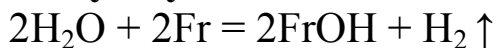
Ishlatilishi. Yadro reaksiyalarida aktiniy bilan β - nurlanish orqali fransiyning gomologlari olinadi va ishlatiladi.

Qotishmasi. Bir qancha izotoplari mavjud.

Olinishi. Kation almashuvchi smolalar yordamida seziydan fransiy ajratib olinadi. Asosan, ekstraksiya va xromatografiya usuli bilan

nihoyatda kam miqdorda olinadi. Hozirgi vaqtda fransiy kam miqdorda sun'iy yo'l bilan olinadi. Ma'lum bo'lgan barcha izotoplari radioaktiv, tez parchalanadi. Eng uzoq yashaydigan izotopining yarmi yemirilish davri 21 sekundga teng. Fransiy aktiniyning parchalanishidan hosil bo'ladi.

Kimyoviy xossalari:



Radiy – Ra

RADIY: belgisi - Ra. 1898-yili P.Kyuri, M.Skladovskaya-Kyuri, J.Bemonlar tomonidan kashf qilingan. Radiy birinchi marta 1910-yilda M.Kyuri va fransiyalik kimyogar A.Devernlar tomonidan elektrolitik usulda olingan. (Radium lotincha “radius”- nur so‘zidan olingan) davriy sistemaning II guruh elementi, tartib raqami 88, atom massasi [226], ishqoriy yer metallari guruhiga mansub radioaktiv metall, kumushday oq, ishqoriy elementlarning eng kuchli ishqorlisi; zichligi $5,500 \text{ g/sm}^3$, $t_{\text{suyuq}}=960^\circ\text{C}$, $t_{\text{qayn}}=1500^\circ\text{C}$ ga yaqin, kislotalarda eriydi, radioaktivlik xususiyatini uning 0,0000001grammidan bilish mumkin, nurlari suvni, ammiakni, vodorod xloridni ajratadi. 1 g radiy 1 soatda 137k/j issiqlik miqdorida energiya beradi. Kuchli fiziologik ta'siri bor: organizm to'qimalarini yemiradi, bakteriyalarni o'ldiradi. Radiy izotoplari ichida eng uzoq yashovchisi ^{226}Ra izotopi (yarim yemirilish davri $T_{1/2}=1620$ yil). Yer qobig'ida $1 \cdot 10^{-10}$ joylashgan.

Minerallari. Radioaktiv minerallar tarkibida uchraydi (U, To, Pa, Po).

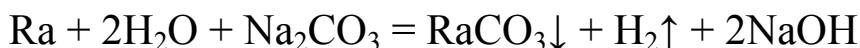
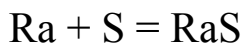
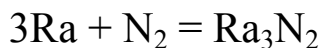
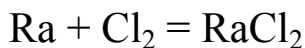
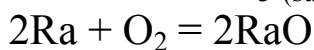
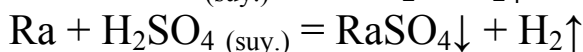
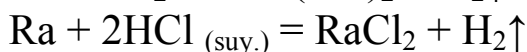
Ishlatilishi. Radiyning radioaktiv xususiyatlari tibbiyotda saraton kasalligini davolashda (radioterapiya), texnikada quyma mahsulotlarning, payvand choklarning (gammadefetoskopiya) sifatini tekshirishda amalda uzoq vaqtlardan beri ishlatib kelinayotgan elementlardan biri. Keyinchalik bu maqsadlarda (^{60}Co , ^{137}Cs va boshqa) ishlatilayotganligi uchun radiyning qo'llanilishi cheklanadi. Radiy tibbiyotda radon manbai bo'lib xizmat qiladi. Radiy yarqiroq moddalar tayyorlashda, neytron manbalari sifatida foydalaniladi.

Qotishmasi. Elektroliz usulda radiy qotishmasi hosil qilinadi.

Olinishi. Tabiatda uran rudalarida uchraydi va ulardan ajratib olinadi (Radiy tuzlarini birinchi marta 1898-yilda er-xotin M.Sklodovskaya-Kyuri bilan P.Kyuri uran rudasidan ajratib olishgan). Uran ajratib olingach, qolgan ruda radiy uchun asosiy xomashyo bo'lib, uni ekstraksiya, xromatografiya va cho'ktirish usullari bilan radiy ajratib

olinadi. Uni toza metall holda olish uchun esa simobli katodda elektroliz usuli qoʻllaniladi. Shuningdek, radiy tarkibida rudalardan radiyni ajratib olish uchun ularga bariy tuzlari qoʻshilib, radiy va bariy sulfatlari bromidlarga aylantiriladi. BaBr₂ ga qaraganda RaBr₂ni suvda yomon erishidan foydalanib, ularni qayta kristallash usuli yordamida bir-biridan ajratiladi va sof holda ionidlar ta'sirida olinadi

Kimyoviy xossalari:



Aktiniy -Ac

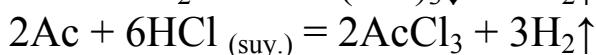
AKTINIY: belgisi - Ac. 1899-yilda kashf etilgan kimyoviy element, (lot. actinum), (yunon. aktis (aktinos) nur) - kimyoviy radioaktiv element, tartib raqami 89, eng koʻp barqaror izotopining massa soni 227. Aktiniy kumushsimon - oq metall, zichligi 10,1 g/sm³; t_{suyuq}=1050-1200⁰C; t_{qayn}=3297⁰C. Aktiniyning Ac²²⁸, Ac²²⁵ izotoplari ma'lum. Uchta radioaktiv qatorlarning biri aktiniy qatori deb ataladi. 1899 yilda fransuz kimyogari A.Devern uranli rudalarni qayta ishlash natijasida hosil boʻlgan chiqindilarning tarkibini oʻrganish mobaynida yangi element aktiniy borligini aniqladi va uni kashf etdi. Aktiniyning radioaktiv qatori hozir uchta radioaktiv qator (radioaktiv oila) ma'lum. Bulardan biri aktiniy qatoridir. Bu qatorning ham boshqa qatorlardagi kabi eng oxirgi a'zosi (A - 207) qoʻrgʻoshindir.

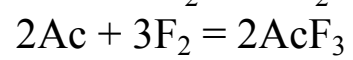
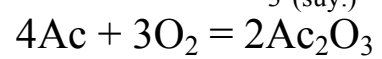
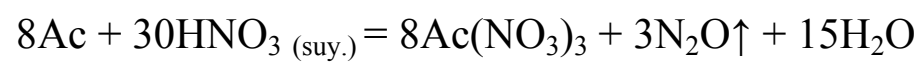
Minerallari. Tabiatda uran va toriy rudalarida uchraydi.

Ishlatilishi. Yadro reaktorida, ilmiy tadqiqot ishlarida ishlatiladi.

Olinishi. Atom reaktorida uranning parchalanishi hosil boʻladi va uning izotoplari olinadi.

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