SUVLI ERITMALARDAN LITIYNISORBSIYA USULIDA AJRATIB OLISH JARAYONLARINI TALIL QILISH

Qayumov Oybek Azamat o‘g‘li

Qarshi davlat texnika universiteti

Annotatsiya. Hozirgi davrda texnologiyaning jadal rivojlanishi, xususan, elektrotexnika, akkumulyator sanoati, kosmik va harbiy sohalarda ishlatiladigan yuqori sifatli xomashyo manbalariga bo‘lgan talabni oshirmoqda. Shu jumladan, litiy elementi o‘zining noyob fizik-kimyoviy xususiyatlari — eng engil metall bo‘lishi, yuqori elektroximik faolligi va issiqlik o‘tkazuvchanligi tufayli turli sohalarda keng qo‘llanilmoqda. Xususan, litiy birikmalari zamonaviy akkumulyatorlar, yuqori haroratga chidamli materiallar va aerokosmik texnika ishlab chiqarishda muhim ahamiyat kasb etadi.

Kirish. Hozirgi davrda texnologiyaning jadal rivojlanishi, xususan, elektrotexnika, akkumulyator sanoati, kosmik va harbiy sohalarda ishlatiladigan yuqori sifatli xomashyo manbalariga bo‘lgan talabni oshirmoqda. Shu jumladan, litiy elementi o‘zining noyob fizik-kimyoviy xususiyatlari — eng engil metall bo‘lishi, yuqori elektroximik faolligi va issiqlik o‘tkazuvchanligi tufayli turli sohalarda keng qo‘llanilmoqda. Xususan, litiy birikmalari zamonaviy akkumulyatorlar, yuqori haroratga chidamli materiallar va aerokosmik texnika ishlab chiqarishda muhim ahamiyat kasb etadi.

Litiy sanoat miqyosida asosan sho‘r suvlar, yer osti tuzli suvlar va texnogen chiqindilardan ajratib olinadi. Shu nuqtai nazardan qaralganda, suvli eritmalardan litiyni samarali ajratib olish muammosi dolzarb hisoblanadi. Bunda sorbsiya jarayonlari yuqori selektivligi, past xarajat talab etishi va ekologik xavfsizligi bilan ajralib turadi. Sorbsiya usuli yordamida eritmalardan litiyni ajratib olish jarayonlarini chuqur o‘rganish va ularni takomillashtirish bugungi ilmiy-texnik taraqqiyotning eng dolzarb yo‘nalishlaridan biri sanaladi.

Mazkur tadqiqot ishida suvli eritmalardan litiyni sorbsiya usuli orqali ajratib olish jarayonlarining nazariy jihatlari tahlil qilinadi.

Litiy strategik ahamiyatga ega bo‘lgan metall bo‘lib, sanoatning ko‘plab sohalarida qo‘llaniladi [1-5]. Litiyning mineral resurslari yildan-yilga kamayib bormoqda, shu sababli litiyning muqobil manbalarini izlash zarurati paydo bo‘lmoqda.Bunday manbalarga namakoblar, ko‘llar, dengiz suvlari va tabiiy eritmalar kiradi. Litiyning istiqbolli manbalaridan biri geotermal issiqlik tashuvchidir [1, 2, 6-8]. So‘nggi yillarda tabiiy issiqlik tashuvchi nafaqat litiy, balki boshqa qimmatbaho komponentlarni olish uchun ham bir qator xorijiy mamlakatlarda keng qo‘llanilmoqda [9, 10]. Hozirgi kunda gidromineral xom ashyodan litiyni ajratib olish usullariga selektiv katodlar va membranali elaklardan foydalaniladigan elektrokimyoviy usullar, selektiv ion almashinuvchi qatronlar yordamida sorbsiyalash, ekstraksiya, flotatsiya va boshqa ko‘plab usullar kiradi. Polshaning Karpat mintaqasidagi geotermal suvdan litiy ionlarini ajratib olish uchun gibrid sig‘imli deionizatsiya usuli qo‘llanilgan [2]. Bunda selektiv katod va anion almashinuvchi membrana bilan qoplangan faollashtirilgan ko‘mirli anod ishlatilgan. Ajratib olish darajasi 73 foizni tashkil etgan. Magniy miqdori yuqori bo‘lgan sho‘r suvlardan litiyni ajratib olish uchun elektrodializ qo‘llanilgan [6]. Litiyni selektiv olishning samarali texnologiyasi sifatida membranali sig‘imli deionizatsiya usulidan foydalanilgan [11]. Taklif etilayotgan texnologiya past energiya sarfi bilan ajralib turadi va ekologik toza hisoblanadi. Marganesning ion elakli oksidi HMnO (Mg) pH=8 muhitda ishqoriy metallar mavjudligida litiy ionlariga nisbatan yuqori tanlovchanglikni namoyish etdi [12]. Marganesning mikrog‘ovakli oksidi (HMO) dengiz suvidan litiy ajratib olishda qo‘llanildi [13]. Sorbsion sig‘imi 7,9 mg/g ni tashkil etdi.Tadqiqotda ikkita ketma-ket ion almashinuv usuli qo‘llanildi [14]. Jarayon ikki valentli kationlarni yo‘qotish va litiyni 99,9% tozalikdagi karbonat ko‘rinishida qayta tiklashdan iborat edi. Titan va marganes oksidlari asosida sintez qilingan materiallar [15] optimal pH=10

bo‘lganda dinamik sharoitda 99% yuqori ajralish darajasini ko‘rsatdi. Seolitlarning sorbsiyasi [16]-ishida tadqiq qilingan. Kaidam havzasi ko‘llari eritmalaridan litiy ajratib olish [4]-ishda o‘rganilgan. Bunda litiyni ajratib olish darajasi 96 foizgacha yetgan. [5]-ishda magniy mavjud bo‘lgan eritmalardan litiyni tanlab ajratib olishni o‘rganish maqsadida organik ekstraktorlar sifatida turli xil ekstragent markalari tanlab olingan.

Xulosa. Tabiiy eritmalardan litiyni ajratib olish jarayonlari va apparaturali rasmiylashtirishni tahlil qilish shuni ko‘rsatadiki, eng samarali usul sorbsion usul hisoblanadi.

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