Ix Operation for the Concentration of Low-Grade Uranium Leach Solution

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Abstract : In this study, two commercial resins were evaluated to concentrate uranium from real solutions that were produced from analkaline leaching process of carbonate deposits. The adsorption was examined using a batch process. Different parameters were evaluated, including initial pH, contact time, temperature, adsorbent dose, and finally, uranium initial concentration. Both resins were effective and selective for uranium ions from the tested leaching solution. The adsorption isotherms data were well fitted for both resins using the Langmuir model. Thermodynamic functions (Gibbs free energy change ΔG, enthalpy change ΔH, and entropy change ΔS) were calculated for the adsorption of uranium. The result shows that the adsorption process is endothermic, spontaneous, and chemisorption processes took place for both resins. The kinetic studies showed that the equilibrium time for uranium ions is about two hours, where the maximum uptake levels were achieved. The kinetics studies were carried out for the adsorption of U ions, and the data was found to follow pseudo-second-order kinetics, which indicates that the adsorption of U ions was chemically controlled. In addition, the reusability (adsorption/ desorption) process was tested for both resins for five cycles, these adsorbents maintained removal efficiency close to first cycle efficiency of about 91% and 80%.
Keywords : uranium, adsorption, ion exchange, thermodynamic and kinetic studies
Conference Title : ICACENS 2023 : International Conference on Advanced Chemical Engineering and Nanoparticle Synthesis
Conference Location : London, United Kingdom
Conference Dates : September 18-19, 2023