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Selective recovery of copper from flotation tailings using liquid-liquid extraction method with ACORGA P50 ligand

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Many countries have limited access to valuable metals, so the development and improvement of the recycling processes of those metals from waste and byproducts are important aspects from economic and environmental point of view. Especially with the growing demand for different elements and requirements of environmental protection, the treatment of waste becomes a very good secondary source of metals in a modern economy.

A potential raw material of copper is secondary material, which is flotation tailings after copper obtaining from its ore. For the efficient recovery of Cu(II) ions, acidic leaching has been performed using an aqueous solution of the nitric acid.

The extraction method for the selective recovery of Cu(II) from nitric acid aqueous solutions using Acorga P50 ligand has been carried out. The effect of the aqueous feed solution pH has been examined, the Acorga P50 extractant concentration, and also the rate of extraction of Cu(II) in batch extraction experiments.

A mixer-settler systems have also been used for the recovery of copper from flotation tailings with hydroxy oxime Acorga P50 ligand in the solvent extraction process. A few contact stages are required, and a pilot plant scale of mixer-settlers is operated with a countercurrent flow of the aqueous and organic phases. Cu-64 was used in the extraction process as a radiotracer. The result showed that almost 99% of Cu(II) was recovered in a solution after stripping under the optimal extraction parameters.

Recent Publications

1. Zakrzewska-Koltuniewicz G, Herdzik-Koniecko I, Cojocaru C, Chajduk E (2014) Experimental design and optimization of leaching process for recovery of valuable chemical elements (U, La, V, Mo, Yb and Th) from low-grade uranium ore. Journal of Hazardous Materials 275:136-145.

2. Petranikova M, Herdzik-Koniecko I, Steenari B-M, Ekberg C (2017) Hydrometallurgical processes for recovery

of valuable and critical metals from spent car NiMH batteries optimized in a pilot plant scale. Hydrometallurgy 171:128-141.

3. Fuks L, Herdzik-Koniecko I, Polkowska-Motrenko H, Oszczak A (2018) Novel procedure for removal of the radioactive metals from aqueous wastes by the magnetic calcium alginate. International Journal of Environmental Science and Technology 15(12):2657-2668.
4. Fuks L, Herdzik-Koniecko I, Maskalchuk L, Leontieva T (2018) Clay-salt slimes of the JSC "Belaruskali" as potential engineering barriers in the radioactive waste repositories: sorption of Cs(I), Sr(II), Eu(III) and Am(III). International Journal of Environmental Science and Technology 15(10):2047-2058.
5. Fuks L, Herdzik-Koniecko I (2018) Vermiculite as a potential component of the engineered barriers in low- and medium-level radioactive waste repositories. Applied Clay Science 161:139-150.
6. Herdzik-Koniecko I, Wagner Ch, Trumm M, Müllich U, Schimmelpfennig B, Narbutt J, Geist A, Panak P J (2019) Do An(III) and Ln(III) ions form heteroleptic complexes with diglycolamide and hydrophilic BT(B)P ligands in solvent extraction systems? A spectroscopic and DFT study. New Journal of Chemistry 43:6314 – 6322.

Biography

Herdzik-Koniecko's work is focused on liquid-liquid and solid-phase extraction of metals. Her research activity spans: separation of actinides/lanthanides/fission products; leaching, ion-exchange and solvent extraction for recycling/recovery of valuable metals from ores and secondary sources (e.g., uranium ores, flotation tailings, waste electrical and electronic equipment), and sorption studies of radionuclides using synthetic and natural raw materials for purification and disposal of radioactive waste..

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