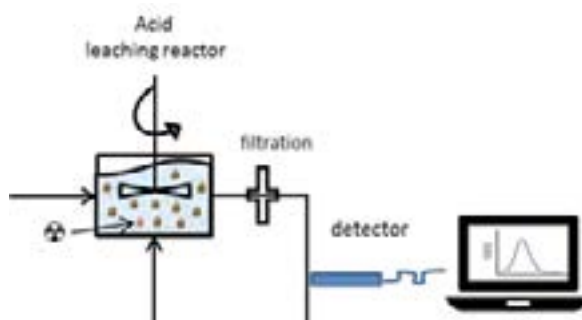


11th World Congress and Expo on **Recycling**

June 13-14, 2019 | Edinburgh, Scotland

Investigation of copper leaching from flotation tailings using of radiotracersTomasz Smoliński¹, Irena Herdzik-Koniecko¹, Marcin Rogowski¹, Marta Pyszynska¹, Dominik Owczarek² and Andrzej G. Chmielewski¹¹Institute of Nuclear Chemistry and Technology, Poland²Warsaw University of Technology, Poland

Copper mining and ore processing is one of the most stable and profitable branch of the Polish economy and one of the fastest growing industry. Commonly used technologies causes high losses of valuable metals into solid wastes streams. The development and implementation of hydrometallurgical technologies might be a solution which is feasible for high elements recovery and decreasing hazardous impact of the wastes storage on the environment. Radiotracer methods are the suitable tool for process investigation since most of the elements involved may be activated and their radioactive isotopes can be easily detected. The separation efficiency, process kinetics and flow dynamics of hydrometallurgical systems can be therefore qualitatively and quantitatively evaluated. A monitoring of radioactive tracer was applied for characterization of copper recovery in leaching process of flotation waste. A sample of waste and standard (a high purity copper metal) were irradiated by thermal neutron flux in MARIA Research Reactor in Świerk (Poland). The activated sample was followed mixed with an inactive portion of flotation tailings in laboratory reactor vessel filled with acid. Atmospheric leach were performed using a sulphuric acid(VI) and nitric acid and other acidic media. The experiments were carried out in a closed loop unit, which included the reactor, pump and filter. The spectra were recorded using a gamma spectrometer equipped with an 3-inch NaI(Tl) scintillation detector. The shielded detector was installed at the outlet of the reactor and placed on a silicon hose. The Cu-64 isotope was used as tracer in experiments. A comparative method was used for determination an amount of copper in acid solution and was calculated on the basis of ratio of areas under photopeaks in a gamma-ray spectrum derived from the sample and standard. In the research the copper recovery at level up to 90% was obtained.

**Recent Publications**

1. Smoliński, T., Rogowski, M., Pyszynska, M., Chmielewski, A.G., Odzysk metali optymalizowany metodami radioizotopowymi, *GOSPODARKA ODPADAMI*, 2/2017, pp 24-27
2. Smolinski T., Wawszczak D., Deptula A., Lada W., Olczak T., Rogowski M., Pyszynska M., Chmielewski A.G.; Solvent extraction of Cu, Mo, V, and U from leach solutions of copper ore and flotation tailings, *J Radioanal Nucl Chem* (2017) 314:69–75
3. Fuks, L., Wawszczak, D., Smoliński, T., Herdzik-Koniecko, I., A.G. Chmielewski Novel Magnetic Cobalt Cyanoferrate Nanoparticles as Potential Sorbent for Solid-Phase Extraction of Radionuclides from Aqueous Samples *Radiochemistry* (2018) 60(4):400-408

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4. Smoliński, T., Rogowski, M., Pyszynska, M., Brykała, M., Chmielewski, A.G., Nuclear Techniques For The Study Hydrometallurgical Processes To Be Applied In Copper Industry; I. Application of ⁶⁴Cu Radiotracer For Investigation Of Copper Ore Leaching NUKLEONIKA 63(4), (2018), pp 123-129
5. Smoliński, T., Rogowski, M., Pyszynska, M., Brykała, M., Chmielewski, A.G., Nuclear Techniques For The Study Hydrometallurgical Processes To Be Applied In Copper Industry; II. Application of Radiotracers for Copper Leaching from Flotation Tailings Investigation NUKLEONIKA 63(4), (2018), pp.131-137;
6. Chmielewski, A.G., Smoliński, T., Rogowski, M., Radiotracers and Nucleonic Control Systems Applied in Industry—Polish Case; World Journal of Nuclear Science and Technology 09(02):27-66 (2019);

Biography

Tomasz Smolinski is a Master of Science in engineering in chemistry. He is a PhD student and works as a chemist at the Institute of Nuclear Chemistry and Technology in Warsaw. His main scientific interesting is concentrated on the radiotracer investigations for metal mining and processing industry. He is also focused on immobilization of nuclear waste into ceramic materials.

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Notes: