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FF-ROUTE - The development of a froth flotation route to pre -concentrate Ilesha -Itagunmodi (Nigeria) gold ore

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The study determined the liberation size of Ilesha - Itagunmodi gold ore. It also carried out the chemical and microstructural characterization of the ore, and derived a froth flotation process route to upgrade the ore. This was with a view to providing information on the appropriate combination of process variables for the beneficiation of gold from the ore.

The ore samples were collected from open pits in Itagunmodi at Ilesha, southwestern part of Nigeria. The samples were panned to give a substantial quantity of black sand residues containing the gold ore. The residues obtained from the panning process were ground using a ball mill and subjected to sieve analysis. Atomic absorption spectrometer (AAS) was employed to determine the liberation size of gold from each fraction obtained from the sieve analysis. Microscopical and chemical characterization were also carried out using X-ray fluorescence and X-ray diffraction. Furthermore, 2^4 factorial experimental design with 3 replicates each was used to derive a froth flotation process route to upgrade the ore. Analysis of variance (ANOVA) and 3D surface graphs were generated using the Design Expert 8.0.3 software by Stat-Ease Inc., of Maryland, USA.

X-ray fluorescence (XRF) indicated that the concentration of gold value in the collected samples was about 0.0024%. X-ray diffraction (XRD) analysis confirmed the presence of gold in form of Au_2O_3. The AAS results showed that the liberation size of gold range from 75 to 150 μm. The 2^4 factorial experimental design results showed that an average gold concentration of about 82.90 ppm was obtained after flotation compared to 44.30 ppm before flotation. This translated to about 87.13 % increase in recovery of gold from the ore.

The study has established a process route for the pre-concentration of Ilesha-Itagunmodi gold deposits for subsequent recovery of the gold value.

Biography

Kayode Emmanuel Oluwabunmi has completed his M.Sc. at the age of 28 from the Department of Materials Science and Engineering, Obafemi Awolowo University, OAU, Nigeria. He is a research and development officer with the National Agency for Science and Engineering Infrastructure (NASENI-PEDI) an agency under the Federal Ministry of Science and Technology in Nigeria, a scholar and passionate researcher in the field of metallurgy and mineral processing. He has about 5 papers to his credit. He has once served as an editorial board member and business manager of a reputable magazine.

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Novel nanostructured MOF aerogels with enhanced adsorption properties

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Volatile organic compounds such as benzene, toluene and xylene (BTX) are prominent constituents in the chemical process industries. These chemicals are frequently used as raw materials in a wide range of manufacturing processes. VOCs, present at low concentrations in industrial and automotive exhaust gas streams, are considered to be major contributors to air pollution because of their harmful effects on the environment.

MOF (metal organic frameworks) are an emerging class of crystalline substances consisting of metal ions or clusters and organic linkers which form a 3D porous structure. This material possesses interesting properties like high surface area, gas storage, catalysis, gas separation and sensing applications. The present study reports that we used MOF as ZIF-8 which is one of the well characterized materials, can be used as an adsorbent in a variety of industrial applications. The nanostructured materials combined a MOF with silica aerogel is a prominent adsorbent for BTX removal. It possesses high surface area, 1947 m^2/g and high thermal stability. This material is prepared by the conventional sol-gel process followed by supercritical drying. The synthesized materials exhibit good adsorption capacity and the results will be presented.

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