ABSTRAK

Variabilitas bijih dalam pengolahan mineral memainkan peran penting yang memengaruhi efisiensi proses dan kualitas produk akhir. Ketidakmampuan untuk mengelola variabilitas ini secara efektif dapat menyebabkan penurunan efisiensi proses, peningkatan biaya produksi, dan kualitas produk yang tidak konsisten. Penelitian ini secara komprehensif mempelajari mengenai aspek geologi dan metalurgi dengan mengkaji karakteristik bijih pada sampel *low-grade* (LG) dan *high-grade* (HG) dengan uji *diagnostic leaching test* (DLT) dan sianidasi dengan beberapa metode seperti *pulverized bottle roll test* (PBRT), *intermittent bottle roll test* (IBRT), dan *column test* (CT). Karakterisasi bijih dilakukan dengan alat-alat canggih, seperti *Analytical Spectral Device* (ASD) dan *Scanning Electron Microscope – Energy Dispersive Spectroscopy* (SEM-EDS) untuk mengetahui mineralogi bijih. Serangkaian pelindian dilakukan mengunakan bijih emas kadar rendah dan kadar tinggi. Pada metode IBRT dilakukan pengambilan sampel pada jam ke-24, 48, 72, 96, 120, 144, 168, 192, 216, 240. Pada metode CT dilakukan pengambilan sampel setiap 24 jam hingga *Solution to Ore* (SO) mencapai 2 kL/ton. Pengukuran konsentrasi emas terlarut dilakukan dengan *Atomic Absorption Spectrophotometry* (AAS). Serta Analisa kadar bijih menggunakan metode ekstraksi *Aqua Regia* yang sesuai dengan standar *laboratory assay* PT Bumi Suksesindo. Berdasarkan analisis SEM-EDS sampel LG tidak dapat diidentifikasi secara morfologi, namun berdasarkan *diagnostic leaching test* termasuk ke dalam *gravity/free cyanidable*. Sampel HG berdasarkan analisis SEM-EDS dan *diagnostic leaching test* termasuk ke dalam *gravity/free cyanidable* dan hadir sebagai *free gold* yang berada diantara kisi-kisi mineral oksida. Persen ekstraksi emas pada sampel LG dengan metode PBRT, IBRT, dan CT secara berturut-turut sebesar 93,81%, 91,85%, dan 84,36%, sedangkan persen ekstraksi sampel HG dengan metode PBRT, IBRT, dan CT secara berturut-turut sebesar 94,74%, 96,19%, dan 90,73%. Semakin tinggi kadar suatu bijih, semakin tinggi juga persen ekstraksi yang diperoleh. Selain itu, semakin kecil ukuran bijih yang di sianidasi, semakin tinggi juga persen ekstraksi yang diperoleh. Hasil yang diperoleh dapat digunakan untuk pengembangan diagram alir atau pemilihan proses dan pengoptimalan pengolahan.

Kata Kunci : Epitermal sulfidasi tinggi, Emas, Sianidasi, Geometalurgi

ABSTRACT

The variability of ores in mineral processing plays an important role that affects process efficiency and final product quality. The inability to effectively manage this variability can lead to decreased process efficiency, increased production costs, and inconsistent product quality. This study comprehensively studied the geological and metallurgical aspects by examining the characteristics of ores in low-grade (LG) and high-grade (HG) samples with diagnostic leaching test (DLT) and cyanidation with several methods such as pulverized bottle roll test (PBRT), intermittent bottle roll test (IBRT), and column test (CT). Ore characterization is carried out with advanced tools, such as the Analytical Spectral Device (ASD) and Scanning Electron Microscope – Energy Dispersive Spectroscopy (SEM EDS) to determine the mineralogy of the ore. A series of leaching is carried out using low-grade and high-grade ore. In the IBRT method, sampling was carried out at hours 24, 48, 72, 96, 120, 144, 168, 192, 216, 240. In the CT method, sampling is carried out every 24 hours until the Solution to Ore (SO) reaches 2 kL/ton. Measurement of dissolved gold concentration was carried out by Atomic Absorption Spectrophotometry (AAS). Analysis of ore content using the aqua regia extraction method which is in accordance with PT Bumi Suksesindo laboratory assay standards. Based on SEM-EDS analysis, the LG sample could not be identified morphologically, but based on the diagnostic leaching test , it was included in gravity/free cyanidable. HG samples based on SEM-EDS analysis and diagnostic leaching test are included in gravity/free cyanidable and present as free gold between the mineral oxide grids. The percentage of gold extraction in LG samples with PBRT, IBRT, and CT methods was 93.81%, 91.85%, and 84.36%, respectively, while the percentage of HG sample extraction with PBRT, IBRT, and CT methods was 94.74%, 96.19%, and 90.73%, respectively. The higher grade ore, the higher gold recovery obtained. In addition, the smaller ore particle size, the higher gold recovery obtained. The results can be used for the development of flow diagrams or process selection and processing optimization.

Keywords : Epithermal high sulfidation, Gold, Leaching, Geometallurgy