

Process Development for Gold Concentrate Recovery by Multi-stage Flotation using Optimized Conditions

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A pre-treatment method for upgrading gold from a polymetallic gold-zinc-lead ore by flotation was studied. X-ray diffraction analysis of the gold sulfide ore showed that quartz, calcite, pyrite, sphalerite, and galena are the main constituents of the ore. The composition of the polymetallic ore contained 6.49 ppm Au, 3.48% Zn, 1.25% Pb, 17.98% Fe, and 20.36% S. Due to the complexity of the polymetallic ore, the gold recovery is generally low. The objective of this study is to develop a primary flotation process to recover gold in a bulk sulfide concentrate. The effects of particle size, collector type, flotation time, and the slurry pH on the recoveries and grades of gold, zinc, and lead were investigated. The developed flotation process consisted of rougher, scavenger, and cleaner stages. High recovery of gold was found to be linked with a high recovery of Pb which was achieved by the utilization of a mixture of collector AERO 7249 and PAX. The gold flotation kinetics were fast with more than 50% of gold recovered within 5 minutes of flotation. Under optimized flotation conditions with rougher, scavenger, and cleaner stages, a total gold recovery of 88.36 % and a final gold grade of 60.97 ppm were obtained. A total gold enrichment ratio of 9.4 was achieved, confirming the viability of the flotation method in upgrading the gold from the polymetallic sulfide ore prior to further processing.

Keywords : Gold, flotation, upgrading, polymetallic sulfide ore, concentrate recovery.