Quantitative Mineralogical Characterisation of Complex Ores to Interpret Behavior in Processing

Djoan Kate Tungpalan[1], Terrence Rosal[1], Paolo Aiman Ramirez[1], Jillian Gabo-Ratio[2]
[1]Department of Mining, Metallurgical and Materials Engineering, University of the Philippines Diliman, Quezon City, Philippines, [2]National Institute of Geological Sciences, University of the Philippines Diliman, Quezon City, Philippines

This research demonstrates the crucial role of quantitative mineralogical measurement for a more efficient resource development. Three different types of ore were quantitatively characterised using the MLA. The characteristics were then used to interpret the potential leaching behavior of the ores. One ore is a refractory gold ore. The gold occurs primarily as tellurides, which implies that cyanide extraction is not practicable. The grain size distribution showed that the gold grains are finer than 30 microns. It was also found that majority of the gold is locked in pyrite. These suggest that the gold is poorly liberated which could slow down the kinetics of gold dissolution. The second ore is an arsenic-copper ore. The primary arsenic minerals are enargite and tennantite, while the primary copper minerals are enargite, tennantite and chalcopyrite. These minerals occur in varying particle sizes, but the concentration and degree of mineral liberation increase as the particle size becomes finer. The MLA measurement showed that the non-arsenic, copper-bearing minerals are closely associated with the arsenic-bearing minerals. This suggests that flotation would not be applicable in separating the arsenic-bearing minerals from the non-arsenic, copper-bearing minerals. A third ore is also an arsenic-copper ore obtained from the oxidized area of the same deposit. The primary arsenic minerals are enargite and scorodite. MLA images showed the occurrence of enargite in varying particle size fractions, and most enargite grains are well liberated. These characteristics, favor the dissolution of arsenic. However, separating the non-arsenic, copper-bearing minerals from the arsenic-bearing minerals is a challenge as the main copper mineral is enargite. The characterisation provided valuable knowledge to better understand the ores and their leaching behavior. This crucial knowledge estimates the recovery efficiency of the target metals which is essential in designing appropriate processing routes for future development of the ore resources.