ABSTRACT

The leaching of roasted zinc ore and copper smelter slag in rotatating disc contactor (RDC) and reciprocating plate column (RPC) was carried out using dilute sulphuric acid as the leachant for zinc leaching and dilute ferric chloride solution for copper slag leaching. In the case of RDC, the parameters studied were - rpm of discs, particle size, solvent concentration, slurry concentration, solvent flow rate, slurry flow rate and temperature. The relevant parametrers in case of RPC were - strokes per minute (spm) of the plate stack, amplitude of reciprocation, particle size, slulrry and solvent flow rates, concentrations of slurry and solvent, and temperature.

The overall liquid side mass transfer coefficient ($K_L a$) based on transfer of reaction product was determined from the experimental data. For RDC, the value of $K_L a_D$, varied from 386 to 642 hr^{-1} for zinc ore leaching and 56 to 118 hr^{-1} for copper slag leaching. For RPC, the value of $K_L a_P$ varied from 450 to 700 hr^{-1} for zinc ore leaching and 40 to 120 hr^{-1} for copper slag leaching.

In order to predict the performance of RDC and RPC, dimensionless correlations have been proposed for $K_L a_D$ and $K_L a_P$, taking into consideration the various physical parameters prevailing in the system and the geometry of the contactor.

Rate equations have been proposed for the surface reaction between roasted zinc ore and sulphuric acid solution and copper smelter slag and ferric chloride solution.

Four leaching models, namely, CSTR in series, plug flow, axial dispersion and shrinking core models were considered to fit the leaching mechanism and to help predict the solvent and the soluble metal value concentrations at any contactor height. The experimental data show a fairly good fit with the shrinking core model for leaching of roasted zinc ore and copper smelter slag in RDC and RPC.

KEY WORDS : Rotating disc contactor, reciprocating plate column, roasted zinc ore, copper smelter slag, mass transfer coefficient,surface reaction rate, leaching models. continuous agitation leaching.