Thermodynamic Evaluations of Extractive Metallurgical Processes

Abstracts of Papers Published in Other Journals

Thermodynamic Evaluations of Extractive Metallurgical Processes

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Among the various, possible applications of thermodynamics to extractive metallurgical processes, the availability of chemical potential diagrams and calculation methods combining stoichiometric relations with equilibrium constants are emphasized. In hydrometallurgical processes, the value of potential-pH diagrams has been well recognized and the application of similar techniques to rather complex systems containing ligands such as the cyanidation process is very interesting. In the roasting of sulfide ores, various information is derived from sulfur-oxygen potential (log P_{S_2}-log P_{O_2}) diagrams. Especially convenient for sulfation roasting are the SO_2-O_2 potential diagrams. Various smelting processes including the direct production of metal from sulfide ore are discussed with the use of chemical potential diagrams. Based upon the prediction derived from sulfur-oxygen potential diagram, the recovery of elemental sulfur from oxidation of FeS is evaluated by stoichiometric calculations. Volatilization behaviour of elements such as zinc, cadmium, and mercury are also explained by similar diagrams and the possibility of the direct distillation of zinc sulfide is predicted by stoichiometric calculations. Analogous calculations are used to clarify the reasons why the segregation process is amenable to copper oxide ore but not to nickel ore.

The Liquid Miscibility Gap and the Distribution of Silver Between Speiss and Metallic Lead in the Pb-Fe-As, Pb-Cu-As and Pb-Fe-Cu-As System at 1200°C

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The liquid miscibility gap and the distribution of silver between speiss and metallic lead for the Pb-Fe-Cu-As quarternary system have been determined at 1200°C. The miscibility gap in the Pb-Fe-As system covered a wide composition range. Molten lead containing a small