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Synthesis of Copper Powder by Mechanically Activated Cementation

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Abstract

Cementation is one of the simplest and low cost methods. It is widely used in industry for recovery of metal and removal of metal ions from dilute wastes, and for purification of solutions. In the present investigations, copper powder was prepared by cementation from a copper sulphate solution of 0.08M by slowly adding the activated iron powder. Activation of iron powder was done by milling it in an attrition mill. Kinetics of the cementation reaction was evaluated by measuring the rate of decrease of metal ions concentration in the solution by spectrophotometry. Studies of the results have shown significant improvement in the cementation rate. Cemented copper powder obtained was characterized for its purity, particle size, grain size and morphology by EDS, laser particle size analyser, XRD studies, TEM and SEM, respectively. The cemented copper powder was found to have particle size in the range of 180 nm to 46 μ m having polygon shape. The average grain size in the powder particles was found to be 54 nm. Few core-shell particles with entrapped iron in copper particles have also been detected.

Keywords: Activated cementation, Mechanical activation, Kinetic study, Copper powder, Core-shell particles, Hydrometallurgy

1. Introduction

Cementation or displacement is basically the electrochemical precipitation of a metal ion from solution by another more electropositive metal. Metal displacement reactions

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