

LEACHING OF CHALCOPYRITES

BY

ANITA KUMARI

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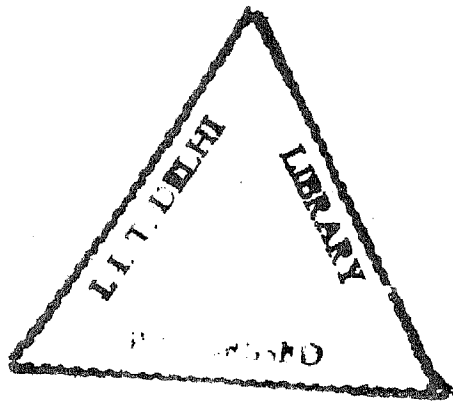
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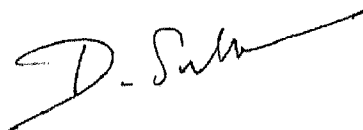
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CERTIFICATE

This is to certify that the thesis entitled "**LEACHING OF CHALCOPYRITES**" being submitted by **ANITA KUMARI** to Indian Institute of Technology, Delhi, for the award of degree of "**DOCTOR OF PHILOSOPHY**" in "**CHEMICAL ENGINEERING**" is a record of bonafide research work carried out by her. She has worked under my guidance and supervision and has fulfilled the requirements for the submission of thesis.

The results obtained in this thesis have not been submitted in part or in full to any other university or institute for the award of any degree or diploma.



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ABSTRACT

Chalcopyrite, the main source of copper, is extracted by pyrometallurgical technology. This technology is highly energy intensive and causes sulphur dioxide pollution. Hydrometallurgical leaching technique can provide an alternative. Several works are reported on the leaching studies of chalcopyrite in different media. Previous work shows that chloride and sulphate media can be possible choice for leaching of chalcopyrite. The effects of additives like NaCl and CCl_4 can improve the leaching performance.

In this work leaching experiments are performed on chalcopyrite concentrate/ore of Indian origin (supplied by Hindustan Copper Limited, Khetri) in chloride and sulphate media using a variety of reagents under inert/oxygen atmosphere in a batch stirred tank reactor. Experimental data on stirred tank reactor are analyzed through integral method of analysis. Reaction rate constant and activation energy are determined for different media. Estimated values of activation energy are compared with the reported values and the agreement is good. Among the experiments on kinetics, chloride media (HCl with FeCl_3 and NaCl) is observed to give best leaching results.

Among the many possibilities, leaching of fine size ore/concentrates in slurry bubble column reactor can offer economy on industrial scale. With this view, leaching in slurry bubble column is studied. Leaching performance of slurry bubble column reactor is observed to be inferior to stirred tank reactor.

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