P R E F A C E

The microbial leaching of metals has been a matter of global interest during the last few years and several international meetings were devoted to highlight its achievements. However, as it appears from reports that most of the investigations were carried out for the leaching of sulfide minerals by ***Thiobacilli*** *and were mainly concerned in the recovery of copper or uranium from sulfide ores. There are also a few reports of leaching of other metals from various ores and minerals by such bacteria, on the other hand, although the heterotrophic micro-organisms like fungi, are able to mobilise mineral elements from rocks and minerals by different mechanism like, acidolysis, complexation, alkalinolysis and uptake of elements in microbial cells, very little work has been done exploiting them.*

As the leaching of metals by fungi deserves due attention, investigation on the role of ***Aspergillus niger*** *and its mutant* ***Aspergillus niger*** X_1 *on removal of silica and iron oxide from bauxite ore has been done and the results are being presented in the thesis. Such removal of silica and iron oxide from ores by chemical methods are troublesome, inconvenient and pollutes the environment, moreover, the chemical method is not as suitable as the microbial method in removing silica from low grade ores. The fast depletion of high grade ores warrants the utilization of low grade ores for the recovery of metals, and hence microbial method is of immense importance in leaching of metals from ores.*

Some general aspects of the present investigation are described in Chapter 1. The selection of a strain of ***Aspergillus niger****, induction of mutation in it to achieve high leaching of silica and iron oxide from bauxite, and the selection of maintenance medium of* ***Aspergillus niger*** X_1 *are described in Chapter 2. The effect of particle size and pulp densities of the bauxite ores on the bioleaching of silica and iron oxide by* ***Aspergillus niger*** X_1 *is described in Chapter 3. Determination of optimum cultural conditions for biolecahing of silica and iron oxide from bauxite ore by* ***Aspergillus niger*** X_1 *with particular reference to (a) initial pH of the medium, (b) temperature of incubation, (c) period of incubation, (d) volume of medium, (e) age of the inoculum and (f) volume of inoculum, is described in Chapter 4. Chapter 5 deals with the selection of suitable carbon and nitrogen sources on leaching of silica and iron oxide from bauxite ore by* ***Aspergillus niger*** X_1*. Mineral element requirement of* ***Aspergillus niger*** X_1 *for bioleaching of silica and iron*

oxide from bauxite ore is presented in Chapter 6. Chapter 7 contains the effect of complex nutrients on bioleaching of silica and iron oxide from bauxite ore by ***Aspergillus niger*** X_1. *The effect of vitamins, amino acids, metabolic inhibitors and antibiotics on bioleaching of silica and iron oxide from bauxite ores by* ***Aspergillus niger*** X_1 *is described in the next Chapter i.e. Chapter 8. Chapter 9 deals with the effect of surface active agents. Chapter 10 provides an insight into the mechanism of silica release process from bauxite ore. Biochemical changes during bioleaching of silica and iron oxide from bauxite ore by* ***Aspergillus niger*** X_1 *are presented in the last Chapter. The general discussion is followed by the summary of the entire work.*

Occasionally, Si, and Fe (iron) appear in this thesis which also mean silica and iron oxide.

This particular bioleaching system has been proved to be successful in the pilot plant scale done in our laboratory by other workers. This is being applied in the industrial sector with promising results and hope, this will open a new vistas in the field of biohydrometallurgy.

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