

CHAPTER 9

EFFECT OF SURFACE ACTIVE AGENTS ON BIOLEACHING OF SILICA  
AND IRON OXIDE FROM BAUXITE ORE BY ASPERGILLUS NIGER X<sub>1</sub>.

Surface active agents has<sup>ve</sup> an inhibitory effect on silica leaching in most of the cases. The surface active agent Tween-80 (polyoxyethylene (20) monooleate) has inhibitory effect for silica release when used for bacterial leaching according to Mohanty and Mishra (156). Reports on the use of surface active agents in microbial metal extraction processes, are controversial. Most of the investigators (201-202) have shown a decreasing effect of surfactants on metal extraction. This adverse effect of surfactants on the release of silica was possibly the consequence of reduction of the surface tension, oxygen uptake and oxygen concentration of the leached solution. Similar conclusion<sup>^</sup> have been drawn by other workers as well (202-208).

In the present work, a study has been carried out to demonstrate the effect of different surface active agents on bioleaching of silica and iron from bauxite ore by A.niger X<sub>1</sub>.

#### 9. EXPERIMENTAL AND RESULTS :

The basal medium used for the experiments consisted of glucose 5%, NH<sub>4</sub>Cl 0.3%, KH<sub>2</sub>PO<sub>4</sub> 0.1%, KCl 0.05%, MgSO<sub>4</sub>.7H<sub>2</sub>O 0.05%, ZnSO<sub>4</sub>.7H<sub>2</sub>O 10µg/ml, MnSO<sub>4</sub>.4H<sub>2</sub>O 5 µgm/ml L(-) proline 1 mg/ml, Folic acid 3 µgm/ml. The pH was maintained at 4.

Surface active agents :

Tween 80, sodium lauryl sulphate, <sup>and</sup> Tween 40 were used as surface active agents. Surface active agents were added in the concentration of 1%, 3%, 5% at 0, 3rd and 5th day of incubation. Leaching process was carried out in 250 ml conical

flask for 7 days at 30°C by surface culture process. The methods for silica and iron estimation and cellular growth were the same as described before (Page No. 47 of the thesis).

Results are shown in Table 9.1.

**Table 9.1 : Effect of surface active agents on bioleaching of silica and iron from bauxite ore by Aspergillus niger X<sub>1</sub>.**

Surface active agents added	Time of addition (days)	Conc. of surface active agents (%)	Cellular growth Dry wt (gm/l)	Silica* leaching (%)	Iron oxide* leaching (%)
Control (No supplement)	-	-	7.2	75.0	80.2
Tween 80	0	1.0	7.2	75.0	80.2
		3.0	7.0	74.5	80.0
		5.0	6.8	74.2	79.0
	3	1.0	7.2	75.0	80.2
		3.0	7.2	75.0	80.0
		5.0	7.0	74.6	79.4
	5	1.0	7.2	75.0	80.2
		3.0	7.2	75.0	80.2
		5.0	7.2	75.0	80.0
Sodium lauryl sulphate	0	1	7.2	75.0	80.2
		3	7.1	75.0	80.0
		5	7.0	79.6	80.0
	3	1	7.2	75.0	80.2
		3	7.0	75.0	80.2
		5	7.1	75.0	80.0
	5	1	7.2	75.0	80.2
		3	7.0	75.0	80.2
		5	7.2	75.0	80.0

Table 9.1. (Contd.)

Surface active agents added	Time of addition (days)	Conc. of surface active agents (%)	Cellular growth Dry wt (gm/l)	Silica* leaching (%)	Iron oxide* leaching (%)	
Tween 40	0	1	7.2	75.0	80.2	
		3	7.1	75.0	80.0	
		5	7.0	74.4	79.4	
	3	1	7.2	7.2	75.0	80.2
		3	7.0	7.0	75.0	80.0
		5	7.1	7.1	74.6	80.0
	5	1	7.1	7.1	75.0	80.2
		3	7.2	7.2	75.0	80.2
		5	7.0	7.0	75.0	80.0

\* Each value is the mean of three individual experiments

It appears from Table 9.1, that Tween 80 has very little effect on silica leaching. Leaching decreases at higher concentration on 0<sup>th</sup> and 3rd day of addition to a very little extent. Sodium lauryl sulfate when added at 0 day leaching decreases to a very little extent at higher concentration. Tween 40 has very little decreasing effect on silica leaching at higher concentration when added on 0<sup>th</sup> and 3rd day. Therefore, the results demonstrate that the above mentioned surface active agents can hardly influence the silica and iron leaching from bauxite by A.niger X<sub>1</sub>.