BIOLEACHING OF MANGANESE (IV) OXIDE AND APPLICATION TO ITS RECOVERY FROM ORES

S. Porro*, E. Donati* and P.H. Tedesco*

* Facultad de Ciencias Exactas de la Universidad Nacional de La Plata, 47 y 115 (1900) La Plata, Argentina.
* Principal Researcher of CIC, CETMIC, Cno. Centenario y 506, C.P. 49 (1897) M.B. GONNET, Argentina. Author to whom correspondence should be addressed.

SUMMARY

Bioleaching of manganese (IV) oxide with Thiobacillus thiooxidans has been studied in media with and without sulfur, ferrous sulfide and ferrous sulfate. The knowledge of the role played by the bacteria and the reducing substances suggest that the leaching of manganese (IV) ores through the use of thiobacteria is only justified when suitable amounts of sulfur or metal sulfides are present.

INTRODUCTION

Dissolution of manganese (IV) oxide through the action of bacteria has been studied by many authors (Imai (1978), Groudev et al. (1984), Ghosk et al. (1965), Myers et al. (1988), Francis et al. (1988), Erhlich (1980)). However, no comprehensive approach has been made to explain the influence of the factors which affect bacterial action and to recommend suitable general criteria to recover through a biohydrometallurgical route the insoluble manganese (IV) from ores.

The chemoautotrophic bacteria Thiobacillus thiooxidans has been used for manganese recovery. It frequently appears associated with Thiobacillus ferrooxidans in metal sulfide ores. These sulfides can be dissolved through the catalysed oxidation induced by both bacteria. The principal difference between them is that Thiobacillus thiooxidans does not metabolize ferrous ion. Its morphology and biochemical action have been treated in many papers (Kelly et al. (1972), Baldensperger et al. (1974), Holt et al. (1974), Kelly et al. (1972), Pivovarova et al. (1974 and 1975).

The principal contributions related to the use of this bacteria in manganese (IV) recovery are those of Imai (1978) and Groudev (1984). Imai has suggested possible mechanisms for the manganese (IV) reduction but he did not explain the role of some additions such as FeSO₄. Groudev's approach was even more general and limited to the comparison of the behaviour of several kinds of bacteria at predetermined conditions.