Simulation of Heap Leaching Process in Sarcheshmeh Copper Complex

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ABSTRACT

A mathematical model called PSPD (Profile Side-Pore Diffusion) with uniform pore length is derived in dimensionless form to simulate the transport of solutes through the flowing channels and the stagnant pores of an unsaturated heap. Model parameters are determined from some experimental tests on copper oxide ore of Sarcheshmeh Copper Comlex.The effects of three factors (particle size, solution flow rate and bed height) are examined. Data from experimental test prove that the advection time is directly proportional to the column height and inversely proportional to the flow rate. This in turn suggests that the model can predict and/or simulates the hydrodynamic behavior in taller columns and possibly heaps.

INTRODUCTION

There have been several attempts during the last twenty-five years to model heap and dump leaching process, by which values metal are extracted from ore particles and recovered from the leaching solution percolating through the ore bed.
Early models involved two-dimensional governing equations to describe the diffusion and convection of fluid into the pore spaces of the heap/dump [1,2]. The flow and transport equations defining the rate at which solutes travel through the bed interstices, exchange across phase boundaries and diffuse through acid-filled pores, now constitute the backbone of any heaping model.
The hydrodynamics of single and multi-component solutes in porous media, as well as those of trickle bed reactors in chemical industries [3,4], are very well documented in literature.
Although heaps, packed towers and trickle bed rectors can all be portrayed as packed bed rectors, the size of their packing material and their operating liquid flow rates are radically different [5,6].

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