The effect of reagents distribution on Zirab coal recovery using flotation kinetics

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ABSTRACT

The effects of reagents distribution on the recovery of combustible matter and ash content of Zirab coal have been studied by using flotation kinetics. Rather than the practice of adding the reagents only at the conditioner (i. e. 100-0%), various combinations of stage addition were examined. It was found that a 70-30 % addition regimen could increase the coal recovery by 1.21% ,due to the recovery of coarser particles. These results have been verified with flotation kinetics, in order to accurately determine the rougher flotation efficiency for various flotation conditions.

Keywords: flotation, reagent distribution, kinetic

INTRODUCTION

Flotation is one of the most complex mineral processing operations as it is affected by a very large number of variables. Particle size plays an important role in flotation processes. The adsorption of the collector on the solid particles is the most important factor affecting the floatability of minerals. Interactions between frothers and collectors have been widely reported by researchers. El-Shall et al (2000) found that frother-collector interactions are dependent upon frother type, however there are few quantitative results on the effect of interaction on the

Concentrations of reagents remaining in solution [1]. A method of measuring the concentration of non-adsorbed reagents on a laboratory scale was developed by K.Hadler et al (2005). The adsorption of the collector (SIBX) and frother (Dowfroth 200) to the solid particles was determined by measuring the concentration remaining in filtered liquid samples taken from the concentrate and tails. They founded that an increase in the initial concentration of SIBX, and an increase in the conditioning time yielded a higher concentrate grade. M.Uçurum (2009) was studied the Influences of Jameson flotation operation variables on the kinetics and recovery of unburned carbon. The results indicated that the Jameson flotation technique is effective in removing the UC from waste filter powder. Furthermore, the classical first-order kinetic flotation model ($R = R_\infty \ [1 - \exp\ (-k * t)]$) was applied to data from the tests. The model was evaluated by statistical technique, after non-linear regression on the model parameters. It was found that the classical first order flotation kinetic model, most extensively used among flotation models, fits the tests data very well [3]. Distribution of reagents down a flotation bank to improve the recovery of coarse particles were studied by Claude Bazin et al (2001) [4]. If a mixture of fine and coarse particles are contacted with a given dosage of collector, most of the collector will be consumed by the fine particles, which in fact need little coverage to be efficiently floated. On the other hand, there would be no sufficient collector available to produce the hydrophobic coverage required to float the coarse particles. An adequate distribution of reagents down a flotation bank could lead to a reduction of collector consumption and provide some gain in selectivity as there would be less entrainment of hydrophilic particles in the first flotation cells as they will be pulled smoother. Their results of exploratory laboratory and full scale trials show that by using 50% or less collector at the top of the bank, with larger additions in the downstream cells provides higher recovery of coarse particles at equivalent or lesser reagent consumption. This lower addition at the top of the bank is sufficient to allow the flotation of fine particles [4]. S. Banisi et al (2003) were investigated the Flotation circuit improvements at the Sarcheshmeh copper mine. To study the stage recovery of copper, one of the eight identical flotation banks was selected for sampling. It was observed that 17% of copper goes to the tailings and the lowest copper recovery was for particles coarser than 105 mm. It was found that a 75-25-O% addition regimen could increase the total copper recovery by 1.3% [5].