

Sulfur Removal from the Gol-e-Gohar Iron Ore Concentrate by Reverse Flotation of Pyrite and feasibility study of using sea water in the desulfurization process

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Abstract

The present study aims to study the feasibility of desulfurization of the Gol-e-Gohar iron ore concentrate down to lower than 0.1% using the flotation process. At the first step, the iron ore was undergone a characterization analysis which resulted that the ore consists of 50.37% iron and 4.12% Sulfur. Afterward, the ore sample was divided into different size classes using screen size analyzing method. Then, the rudimentary wet magnetic separation experiments were conducted for three size classes of the sample in order to determine the liberation degree of the sample, by which $d_{80} = 106 \mu\text{m}$ was found as the size in which the magnetite ore sample has an appropriate liberation degree. The wet magnetic separation experiments were performed with field intensity of 800G, feeding time of 3 min, feed water flowrate of 4 liters per min, drum rotational speed of 54 RPM with rotation in parallel direction with feeding in which an iron grade of 63% along with a Sulfur content of 0.52% with an iron recovery of 96% was obtained. In order to reach further Sulfur reduction, the concentrate of the magnetic separation was reprocessed using reverse flotation of pyrite. In the wake of that, in order to reach an optimum operational condition in terms of flotation time and reagent usage, a few rudimentary tests were performed and finally the flotation time (pulp retention time within the cell) of 5 min along with an collector dosage of 100 g/Mg in pH=9 was found to be the best possible condition to reach a Sulfur content of lower than 0.1%. Also, a yield recovery of 95.96% for iron concentrate with an overall iron recovery of 94.9% was obtained. According to the feasibility study, sea water is not a suitable alternative to conventional tap water in the iron desulfurization process.

Keywords: Magnetic Separation, Gol-e-Gohar, Iron, Sulfur, Pyrite, Flotation

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