

UPGRADING OF THE EPPAWALA PHOSPHATE ORE BY FLOTATION

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Phosphate ores are of great importance to the growth and prosperity of all nations. From phosphate ores, fertilizers are produced which are of utmost importance to man and his survival. About 80% of the total world production is used for the production of fertilizers, 10% is used in the chemical industry and 10% is used in metallurgical fields.[1]

The present beneficiation study was conducted to determine if Sri Lankan phosphate ore could be upgraded via froth flotation to produce a suitable product for the fertilizer industry. Since Sri Lanka is in the process of establishing a fertilizer industry, methods should be developed to produce a phosphate concentrate from available Sri Lankan phosphate ore deposits. The objective of this work is to provide such a method to meet the necessary requirements set forth by the industry.

Some countries, including Canada and Sri Lanka, are searching for these technological advancements to develop and up-grade their low grade deposits. Generally, froth flotation is the most widely used beneficiation method in the industry, where the phosphorus bearing minerals are selectively separated from the gangue minerals using their physico-chemical surface characteristics.

The gangue minerals may include carbonates, silicates, and oxides. Other phosphate beneficiation methods such as gravity separation (jig, shaking table) have a limited use in industry. Therefore, the objective of this project is to lay out the fundamental aspects of phosphate flotation from an academic and practical point of view, and to establish a flotation technique that will up-grade Sri Lanka phosphate ore to meet the fertilizers industry requirements.

5 kg phosphate ore samples from Eppawala region of Sri Lanka were crushed, ground and subjected to a froth flotation process. The flotation employed soap and fuel oil as flotation reagents and pH 10.0 with NaOH as a pH regulator, a low selectivity was reached. The ore sample has an (I & A) ratio (ratio of iron and aluminium content) of 0.1550 and assays at 37.27% P_2O_5 .

The findings of this work are:

- (1) The phosphate ore was upgraded to 0.095 (I & A) ratio, and 40.5% P_2O_5 .

- (2) The reagents used, fuel oil, soap and NaOH, was found to be partially effective.
- (3) A double de-sliming of the feed at -200 mesh (75 microns) removed the fines that would interfere in the flotation.
- (4) The recovery obtained was 60% of the flotation feed.

Though reasonable results were achieved in this work, more work must be undertaken to ensure the performance of the suggested flotation technique. For future work other variables could be tested to examine their effect on the proposed technique, and perhaps increase its efficiency to give higher recoveries. Improved de-sliming and hematite depression would result in higher recovery. The final product meets the industry requirements, but the low recovery obtained makes it questionable.

References

- (1) M.C. Fuerstenau, J.D. Miller and M.C. Kuhn, 1985. "Chemistry of Flotation. Published by SME (AIME), 125-128 pp.