BENEFICIATION OF LOW GRADE LIMESTONE FROM ACC MINE, MADUKKARAI, COIMBATORE DISTRICT, TAMILNADU, INDIA

C. Rudrappa, * B.P. Ravi, V. Rampur, P.S. Kumar and M.V. Rudramuniyappa

Mineral Processing Department, VSKU PG Centre, Nandihalli

*Email: ravibelavadi@gmail.com

Abstract

A low grade limestone from ACC mine, Madukkarai, Coimbatore district, Tamil Nadu was subjected to beneficiation by cationic reverse flotation process with the aim of producing cement grade and metallurgical grade concentrates. The low grade limestone analyzed 45% CaO, 80% Total Carbonate (TC), 18% SiO₂, 1.3% MgO, 1.30% Fe₂O₃, 2.50% Al₂O₃, 0.33% alkalies and 36.00% LOI. It contained mainly calcite and quartz which were mutually inter grown with a fair degree of liberation at 65 mesh size. Reverse cationic flotation was preferred to direct soap flotation as practiced in beneficiation plant at Madukkarai. Inverse flotation studies were carried out to float siliceous impurities using cationic collectors of varying collector type, collector dosage, mesh of grind and pulp density. Cement grade composite concentrate (non-float and slimes) assaying 9.51% Acid Insoluble (AI), 90% Total carbonates at wt.% yield of 88 by a process comprising of grinding to MOG D₅₀ 400 microns, desliming/ screening over 400 mesh, rougher conditioning with 0.4kg/t SOKEM565C for 2 minutes at 50% Solids, rougher flotation for 4 minutes, at pH 8 and 28% Solids. The float of -16+400 mesh sand fraction assaying 80.30% Acid Insolubles, 18% Total Carbonates may be used as eco sand. On the contrary, premium metallurgical grade concentrate assaying 54.64% CaO, 0.6% SiO₂, 0.7% MgO, 1.4% Fe₂O₃, 0.7% Al₂O₃, 41.0% LOI with weight % yield of 55.2, could be produced at20% solids, MOG D₅₀ 400 microns, and pH 8 with 1.0 kg/t of SOKEM 565 C. The evolved nil waste process is stable, selective, and easily adaptable in the existing anionic soap direct flotation plant at ACC Madukkarai Cement Works, yielding valuable products.

Keywords: Flotation, Cationic collectors, Limestone flotation, Cement and Metallurgical grade limestone, Nil-waste process evolution