

THE ECONOMIC POTENTIAL OF LOCAL DOLOMITE FOR NANO-PRECIPIATED CALCIUM CARBONATE PRODUCTION IN INDUSTRIAL SCALE

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With vast area of usage in paper, plastic, paint, sealants, lubricant oil and so on, Precipitated Calcium Carbonate (PCC) is a viable product for income generation in Sri Lanka. Since nanoparticles exhibit unique and enhanced properties, they are much more desirable to be used in end-products. The potential of local dolomite for NPCC production is evident in recent research. All research has been conducted in laboratory scale and it is yet to be evaluated for industrial scale utilization. Certain procedures such as autoclaving cannot be used in industrial scale due to its high energy demand. Moreover the cost factor of using different chemicals is to be optimized to facilitate the large scale production. Hence the current research targets to evaluate the suitability of local dolomite for precipitated calcium carbonate production in industrial scale.

Locally purchased calcined dolomite was used for the synthesis after characterization. The samples were subjected to atomic adsorption spectroscopy (AAS), scanning electron microscopy (SEM), energy dispersed X-ray (EDX) spectroscopy and X-ray diffraction (XRD) analysis. The calcium extraction from the dolomite samples were carried out through the sucrate route. The extractability of calcium to the sucrose medium was studied with varying sucrose concentrations for equal amount of calcined dolomite. The study revealed that the best extraction was in 30% (W/V) sucrose solution. Additionally the re-usability of the sucrose solution was determined. For PCC synthesis, 0.5 M sodium carbonate solution was added dropwise to the extracted calcium sucrate solution. Different surfactants were used to retard the agglomeration and gain the particles in nanometer scale. Different surfactants such as Triton X-100, sodium dodecyl

sulphate (SDS) and cetyl trimethyl ammonium bromide (CTAB) were utilized for the synthesis. Moreover, the suitability of citrate complex was evaluated against the surfactant usage. The effect of each above method was studied by characterizing the respective products through SEM, EDX and XRD analysis. SDS and citrate exhibited better refined nanoparticles compared to those of Triton-X-100 and CTAB.

Keywords: Dolomite, Nano-PCC, Industrial scale