

THE EFFECTS AND OPERATIONAL PARAMETERS ON PRECIPITATED CALCIUM CARBONATE PRODUCTION FROM DOLOMITIC LIME

K.H.N. SURANJANI

Postgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka

The possibility of production of precipitated calcium carbonate (PCC), which received a significant attention owing to its wide application in many industries, was studied from readily available dolomitic lime material in Sri Lanka. The study was carried out through calcination of dolomitic lime, slaking dolime and by precipitating calcium carbonate via a carbonation reaction. The effect of initial temperature of hydrate, initial concentration of milk of dolime and the blowing rate of CO₂ gas were investigated.

Thermal heating of raw dolomite to 950 °C leads to the complete transition of dolomite to the mixture of magnesium and calcium oxides. Differential thermal analyses (DTA) curves showed the two endothermic peaks at 770 °C and 865 °C respectively and the X-ray powder diffractometer (XRD) analysis confirmed this two stage decomposition. Initial temperature of water and the volume of water taken for dolime slaking had considerable effect for calcium oxide dissolution. It was noticeable that magnesium oxide dissolution is faster at long stirring hours.

Fluctuation of pH and conductivity during the carbonation process studies showed that the operation can be shut down when the pH decreases to below 7 and conductivity decreases to below 2 mS cm⁻¹. The maximum yield was obtained at 20 ml/min CO₂ gas flow rate by using the hydrate which preheated up to 60 °C. The resultant PCC powder was pure calcite with a rhombohedral crystal structure consisted of {1 0 4} phase which was confirmed by the XRD analysis. By reviewing the results of all the experiments, it could be considered that the PCC production from Sri Lankan dolomitic lime is possible for proposing as an industrial method from the investigated production method.