



Surfactant Aided Synthesis of Precipitated Calcium Carbonate Nano-particles from Chicken Egg Shell by Co-precipitation Method

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Abstract

Calcium carbonate nano-sized particles have been extensively used in various industries such as paper, pharmaceutical and consumer goods as coating and filling agents. Chicken egg shell, a bio waste that is generated and discarded in huge quantities all over the world, contains about 95% calcium carbonate and can be considered as a natural source for this important material. In this study, nano-sized calcium carbonate particles were synthesized by a chemical co-precipitation method using aqueous suspension of calcium oxide derived from egg shell and sodium carbonate solution. The latter was added to the reaction mixture in the form of micro droplets using a mechanical sprayer device and all-at-once to study if the micro droplets result into smaller size of calcium carbonate particles. The effect of cationic and anionic surfactants was compared by using cetyltrimethylammonium bromide (CTAB) and Sodium dodecyl sulfate (SDS), respectively, in varying concentrations. The synthesized calcium carbonate nano-particles were characterized by scanning electron microscopy, transmission electron microscopy, powder x-ray diffraction, Fourier transform infrared spectroscopy and BET surface area analysis. The synthesized particles were found to be well crystallized calcite polymorph and varied from 20 to 50 nm in size. This synthesis procedure can be adopted in various industrial applications such as production of pharmaceuticals and consumer goods.

Keywords: *Precipitated calcium carbonate, Nano-particles, Co-precipitation method, Chemical technique, Cationic and anionic surfactants*
