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Optimization of Sodium Lauryl Surfactant Concentration for Nanoparticle Production

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Abstract : Sodium lauryl surfactant concentration optimization, for nanoparticle production, provided the platform for advanced research studies. Different concentrations (0.05 %, 0.1 %, and 0.2 %) of sodium lauryl surfactant was added to snail shells powder during milling processes for producing CaCO3 at smaller particle size. Epoxy nanocomposites prepared at filler content 2 wt.% synthesized with different volumes of sodium lauryl surfactant were fabricated using a conventional resin casting method. Mechanical properties such as tensile strength, stiffness, and hardness of prepared nanocomposites was investigated to determine the effect of sodium lauryl surfactant concentration on nanocomposite properties. It was observed that the loading of the synthesized nano-calcium carbonate improved the mechanical properties of neat epoxy at lower concentrations of sodium lauryl surfactant 0.05 %. Meaningfully, loading of achatina fulica snail shell nanoparticles manufactures, with small concentrations of sodium lauryl surfactant 0.05 %, increased the neat epoxy tensile strength by 26%, stiffness by 55%, and hardness by 38%. Homogeneous dispersion facilitated, by the addition of sodium lauryl surfactant during milling processes, improved mechanical properties. Research evidence suggests that nano-CaCO3, synthesized from achatina fulica snail shell, possesses suitable reinforcement properties that can be used for nanocomposite fabrication. The evidence showed that adding small concentrations of sodium lauryl surfactant 0.05 %, improved dispersion of nanoparticles in polymetrix material that provided mechanical properties improvement.

Keywords : sodium lauryl surfactant, mechanical properties , achatina fulica snail shel, calcium carbonate nanopowder
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