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Value Added Products: Nanopigments

Neeraj Kumari
Assistant Professor, K R Mangalam University, India

Abstract

The main objective of the present study is to study the interaction of non-biodegradable toxic dyes, Crystal Violet (CV) and Indigo Carmine (IC) with naturally occurring clay minerals (Montmorillonite (Mt)) and their organically modified forms (Organo Montmorillonite (OMt) in batch extraction mode and to develop a novel methodology for the synthesis of the value added products, clay based nanopigments without creating second generation waste materials. During extraction of CV and IC, it was observed that the uptake of CV was more onto pristine Mt while the uptake of IC was more onto OMt. CV was found in the interlayer region as well as on the surface of Mt as supported by XRD data and zeta potential values (zeta potential value varies from — 17·6mV to — 9·42mV in case of Mt and in case of organo Mt, it was found on the surface. The increase in the particle size of pristine clays and organo clays further confirmed the presence of CV on their surface. IC was found only on the surface of pristine clays and organo clays as there was no change in the interlayer spacing of organo Mt. The surface interaction of IC was further confirmed from zeta potential and particle size values.

After extraction of CV from aqueous media, the intense violet (CV treated pristine and organo Mt) and blue (IC treated pristine and organo Mt) colored solid residues obtained (also known as clay based nano pigments). The nano pigments further used as colorant in Poly(methylmeth acrylate) (PMMA) polymer matrix to form transparent polymer films where nano pigments play dual role, act as reinforcement filler by enhancing their various physico-chemical properties and a coloring agent by providing attractive bright color to the polymer matrix.

Yadav.neeraj.1987@gmail.com