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Characterization and modification of clay materials, solid-phase reactions of organic molecules intercalated in clay minerals and their utilization in contaminant attenuation

Theresa O Egbuchunam¹, Felix E Okieimen² and G Obi¹

¹Federal University of Petroleum Resources, Nigeria

²University of Benin, Nigeria

The substitution of cations in the interlayer region of clay with different amounts of cetyltrimethyl ammonium bromide (CTAB) was carried out with the aim of synthesizing an organoclay which represents a new class of materials that may find application in waste water treatment. Clay materials from Otedo, in Ughelli South in Delta State in Southern Nigeria, was purified and subjected to a procedure used for organoclay synthesis comprising: washing, drying, sieving, cation exchange and drying. The modified clay samples were characterized by infra-red (IR) spectroscopy, Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AES), X-ray diffractometry (XRD), Scanning Electron Microscopy (SEM) and Thermogravimetric analysis (TGA). An increase, albeit slight, in the basal spacing of the modified clay material indicates the intercalation of organic moiety between the layers of kaolinite. SEM images show modification with the intercalation of the organic surfactant as there was a reduction in the clay particle size and agglomeration. The frequency shifts of the absorption bands in the ranges of 1700-1600 cm^{-1} and 3700-3600 cm^{-1} from the FTIR spectra provide additional evidence resulting from the replacement of hydrated cations (free and interlayer water) by the organic surfactant. The reduced moisture content in the organoclays as observed after thermal treatment indicates that the hydrophilicity of the surface of the kaolinite clay was greatly reduced.

Biography

Theresa O Egbuchunam, is a scientist with a proven technical track record in teaching and research in chemistry at the tertiary level, has research experience in polymer materials, environmental pollution and controlmanagement. She is an Associate Professor of Materials Chemistry and presently a member of the Governing Council, Federal University of Petroleum Resources, Effurun, Delta State, Nigeria. She also has extensive research experience in the chemistry of polymer materials and has written and published extensively in local and international journals.

tessychunam@gmail.com

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