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Synthesis and characterization of bentonite/Co_3O_4 (Be/CO) nanocomposite

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Bentonite comprises a group of layered silicates. A comprehensive review of the literature reveals that the chemical composition of calcium-containing bentonite is not uniform and varies depending on its origin. In general, clay minerals consist of Si, Al, Fe, H_2O, and alkaline/alkaline earth metals[1]. The primary structure of bentonite consists of two atomic lattice units, namely tetrahedral and octahedral layers. The tetrahedral layer contains Si^{4+} ions at its center, surrounded by O^{2-} ions, while the octahedral layer is formed by Al^{3+} ions in the middle, surrounded by six OH^- ions at the corners[2]. The ion exchange process of Si^{4+} and Al^{3+} is accomplished with cations of lower valence such as $Fe3^+/Mg^{2+}/Ca^{2+}$ and Na^+. The current study investigates the surface absorption capacity of natural bentonite soil, which has been modified with sulfuric acid, to enhance its absorption capacity. To achieve this, bentonite soil has been impregnated with cobalt oxide nanoparticles using the in-situ synthesis method[3]. X-ray diffraction (XRD) analysis, Field emission scanning electron microscopy (FE-SEM), and X-ray scattering analysis energy (EDX) were carried out to identify natural bentonite soil and to modify it with cobalt oxide nanoparticles. The results indicated that the cobalt oxide nanoparticles were dispersed on the surface of bentonite soil.

Keywords: Bentonite, Co_3O_4, characterization

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