

## V<sub>2</sub>O<sub>5</sub>, CeO<sub>2</sub> and Their MWCNTs Nanocomposites Modified for the Removal of Kerosene from Water

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In this paper, the application of multiwalled carbon nanotubes (MWCNTs) based on metal oxide nanocomposites as adsorbents for the removal of hydrocarbons such as kerosene from water was investigated. Functionalized MWCNTs were obtained by chemical oxidation using concentrated sulfuric and nitric acids. V<sub>2</sub>O<sub>5</sub>, CeO<sub>2</sub>, and V<sub>2</sub>O<sub>5</sub>:CeO<sub>2</sub> nanocomposites were prepared using the hydrothermal method followed by deposition of these oxides over MWCNTs. Individual and mixed metal oxides, fresh MWCNTs, and metal oxide nanoparticle-doped MWCNTs using different analysis techniques were characterized. XRD, TEM, SEM, EDX, AFM, Raman, TG/DTA, and BET techniques were used to determine the structure as well as chemical and morphological properties of the newly prepared adsorbents. Fresh MWCNTs, Ce/MWCNTs, V/MWCNTs, and V:Ce/MWCNTs were applied for the removal of kerosene from a model solution of water. GC analysis indicated that high kerosene removal efficiency (85%) and adsorption capacity (4270 mg/g) after 60 min of treatment were obtained over V:Ce/MWCNTs in comparison with fresh MWCNTs, Ce/MWCNTs and V/MWCNTs. The kinetic data were analyzed using the pseudo-first order, pseudo-second order, and intra-particle diffusion rate equations.

### Słowa kluczowe

MWCNTs, nanoparticles, metal oxide nanocomposites, kerosene removal from water

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