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Synthesis and characterization of the textile composites for petroleum products sorption

D. Angelova, D. Staneva, V. Toteva, D. Atanasova

University of Chemical Technology and Metallurgy, 8 Kliment Ohridski, Sofia 1756, Bulgaria

Abstract

Two composite textile materials were obtained and their adsorption properties against petroleum products from water surface were investigated. The textile was modified by the addition of glutaraldehyde cross-linked chitosan, and zinc oxide particles were synthesized to one of the samples by in-situ method. Changes in the surface of the material were determined by SEM analysis. The chitosan film formation on the surface binds the individual fibers of the yarn together and fills the gaps between them. The zinc particles' inclusion in the applied layer results in a denser surface coverage, where the characteristic relief of the cotton fabric is almost lost. At the surface between the fibers, it is seen that the zinc particles form numerous islands surrounded by the chitosan layer but retain their characteristic well-developed surface. The study of the sorption properties of textile composite materials shows that the Zn oxide particles' addition to their surface improves their sorption capacity concerning petroleum, oil SN 150 and diesel fuel. The materials display the highest sorption capacity of petroleum and the lowest for diesel fuel. The textile composite materials regeneration ability was investigated. It has been established that they can be successfully regenerated and reused without a significant change in their sorption capacity. This makes the obtained materials extremely efficient. They can be used repeatedly and allow the separation and utilization of the absorbed petroleum products.

Keywords: modification, chitosan, sorption capacity, regeneration

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