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RESEARCH ARTICLE

Preparation of Graphene Oxide from Waste Pencils and Loading it on the Surface of Melamine-Formaldehyde/rGO Composite for Hydrocarbons Removal

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ABSTRACT

With the increasing technological development, the problem of hydrocarbon pollution has become one of the urgent problems of our current era. Many techniques have been proposed and applied to address this phenomenon, including the use of polymer-based nanocomposites. This study involved the preparation of a few wrinkled layers of graphene oxide from waste pencils (wp-GO) as proved by the High-resolution transmission electron microscopy HRTEM image. Besides, magnetic iron oxide nanoparticles were synthesized and showed superparamagnetic properties due to the magnetic properties of 40 emu/g saturation magnetization and close to zero coercivity, the structure is mostly spherical particles with a diameter of 8–10 nm. These nanomaterials were exploited as a composite along with melamine-formaldehyde polymer MF. The HRTEM results showed that the prepared wp-GO-MF composite has a stable structure with many porous. The wp-GO-MF composite was applied for several hydrocarbons adsorption. Hydrocarbons adsorption study was accomplished using benzene, toluene, m-xylene, hexane, heptane, kerosene, and diesel oil. The findings revealed that the wp-GO-MF composite performs the highest sorption capacity (Qe) for kerosene at 71 g g^{-1}. Adsorption capacity was maintained at around 90% for the hydrocarbons up to 10 absorption cycles. Therefore, it can be concluded that the wp-GO-MF composite successfully showed an excellent sorption capacity for all tested hydrocarbons with superb recycle performance.

Keywords: Composite, Hydrocarbons adsorption, Magnetic iron oxide nanoparticles, Melamine formaldehyde polymer, Waste pencils

Introduction

Petrol disasters involving spills of oil on oceans and seawater happen overwhelmingly in the present time and require a rapid and economically suitable solution.[1] Consequently, a critical issue herein is the removal of traces of harmful hydrocarbons organic from aqueous solutions. Recently, the pollution of water has had a substantial impact on humans and the environment, which requires critical and effective processes to deal with this issue.[2] Aromatic hydrocarbons are considered one of the usual pollutants among all dangerous environmental contaminants, which are created due to the burring of organic compounds such as coal, oil, gas, wood tobacco, etc. Organic hydrocarbons can be considered as extremely serious compounds that can cause chronic and persistent health effects.[2] Many methods were used to handle pollution problems. Diverse treatment methods such as chemical, thermal, biological and UV-vis techniques have been applied to eliminate these environmental pollutants.[3] However, these methods have

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