

# Adsorption of Phenol and Microwave-assisted Regeneration on Carbon Nanotube/Carbon Fabric Composites

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## Abstract

This study develops an environmentally disaster prevention technology that can adsorb phenol from wastewater by using carbon nanotube (CNT)-activated carbon fabric (ACF) composites. Liquid-phase adsorption of phenol and regeneration efficiency on CNT-ACF composites has been investigated. The high-performance CNT-ACF composites can be prepared through a catalytic chemical vapor deposition approach. The growth technique is capable of decorating CNTs on microscaled ACFs, creating a hierarchical CNT-ACF composite. The as-grown nanotubes were found to have a tortuous shape and to be several micrometers in length. Experimental results showed that the as-prepared CNT-ACF composites exhibit high adsorption capacity of phenol and removal efficiency and the adsorption behavior is well characterized by Freundlich and Langmuir isotherms. An efficient microwave-assisted method is adopted to regenerate the exhausted CNT-ACF composites. After the microwave regeneration (720 W, 20 min) for two times, fairly-high regeneration efficiency of phenol (similar to 79.1%) can be achieved. The merit of the present work sheds some light on (i) the fabrication of CNT-ACF adsorbents with high removal efficiency of organic compounds and (ii) the rapid route to regenerate the exhausted adsorbents.

Keyword : Activated carbon fabrics; Chemical vapor adsorption; Carbon nanotubes; Adsorption; Phenol; Microwave regeneration  
KeyWords Plus: ACTIVATED CARBON; PHASE ADSORPTION; WATER; BEHAVIOR