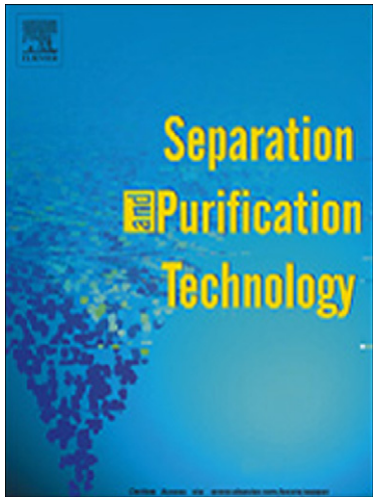

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Tuning the Adsorption Capability of Multi-walled Carbon Nanotubes to Polar and Non-polar Organic Compounds by Surface Oxidation

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Abstract

This current study addresses the inter-relationship between the surface oxidation of multi-walled carbon nanotubes (MWCNTs) and the polarity of organic solutes and its effect on the adsorption reaction between them. Results indicated that pristine MWCNTs exhibited a stronger affinity toward non-polar compounds such as phenanthrene compared to that of ozone-oxidized MWCNTs (O-MWCNTs). On the contrary, the adsorption of polar compounds, such as phenol, on MWCNTs occurred to a much less extent compared to that on O-MWCNTs as indicated by a smaller Freundlich affinity coefficient. The adsorption capability of various organic compounds on MWCNTs could be tuned. It was found that the stability of MWCNTs did not control the adsorption capacity. The solution chemistry only had minimal influence on the adsorption of phenanthrene on MWCNTs. Results demonstrated the importance of surface chemistry and the properties of adsorbates on the adsorption process. Overlooking either aspect might lead to a misinterpretation of the adsorption reaction. Understanding the interactive nature of MWCNTs adsorption provides information on the preparation of green and "smart" adsorbents according to the nature of adsorbates.

Keywords: MWCNTs; surface oxidation; ozone, polarity; adsorption; phenols; phenanthrene