



## Application of Carbon Based Nanomaterial in Industrial Wastewater Treatment

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**Abstract:**Multiwall carbon nanotubes (MWCNTs) were chemically modified to yield products that remove selective pollutants from wastewater stream (Scheme 1). It was found that when the surface of MWCNTs is modified with the cationic surfactant cetyltrimethyl ammonium bromide (CTAB), a product that can remove Cr(VI) selectively was obtained.(98%). On the other hand, surface modification with the anionic surfactant sodium lauryl sulfate (SLS) after magnetization yielded a product that can remove Cr(III) selectively (99%). Langmuir isotherm model was the best fit for the removal of Cr(III) by MWCNTs-M-SLS and Cr(VI) by MWCNTs-CTAB, with an adsorption capacity of 66.2 mg/g and 27.8 mg/g, respectively. Adsorption kinetics for the removal of Cr(III) by MWCNTs-M-SLS and Cr(VI) by MWCNTs-CTAB, demonstrated that the adsorption is very fast (< 5min) for both ions. A regeneration study on saturated MWCNTs-CTAB was performed at 25oC and 35oC, in two cycles of desorption-adsorption with some reduction in performance. Surface modification with SLS, was found also to improve the removal lead ions from aqueous solution (from q = 3.81 to 141 mg/g).



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### Publications :

1. Sabri, M., Ibrahim, T., Khamis, M. (2019) "Application of multiwalled carbon nanotubes and its magnetite derivative for emulsified oil removal from produced water", *Environmental Technology Journal*, 40(25), 3337-3350. doi:10.1080/09593330.2018.1472302.
2. AbouChacra, L., Sabri, M., Ibrahim, T., Khamis, M., Hamdan, N., Al-Asheh, S., AlRefai, M., Fernandez, C. (2018) "Application of graphene nanoplatelets and graphene magnetite for the removal of emulsified oil from produced water", *Journal of Environmental Chemical Engineering*, 6, 3018-3033.
3. Suliman, M., Ibrahim, T., Jumean, F., Khamis, M., Sabri, M. (2018) "Removal of lead ions from wastewater using multi walled carbon nanotubes modified with sodium lauryl sulfate", *Desalination and Water Treatment*, doi: 10.5004/dwt.2017.21829.
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5. Ray, P., Sabri, M., Ibrahim, T., Khamis, M., Jumean, F. (2018) "Design and Optimization of a Batch Sequential Contactor for the Removal of Chromium(VI) from Industrial Wastewater Using Sheep Wool as Low Cost Adsorbent", *Desalination and Water Treatment*, 113,109-113.doi:10.5004/dwt.2018.22365.

[World Congress on Carbon and Advanced Energy Materials March 16-17, 2020](#)

**Abstract Citation:**[Mustafa Khamis,Carbon materials 2020, World Congress on Carbon and Advanced Energy Materials, March 16-17, 2020, Biosynthesis, Application of Carbon Based Nanomaterial in Industrial Wastewater Treatment.](#)