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## Using of carbon/lignin biocomposite as recyclable sorbent in-situ for elimination of VOCs from oily wastewaters

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In this review, it was showed how by developing a facile one-pot co-precipitation process, the granule activated carbon (gAC)/Kraft lignin (KL) biocomposite (gAC/KLx) was constructed from recycling industrial wastes of both palm-date pits and pulping black liquor as a new eco-friendly sorbent. The ATR-FTIR, XRD, SEM, BET, TGA, DLS and Zeta potential analyses were used to characterize the gAC/KL biocomposite prepared to be used as an effective sorbent of environmentally toxic (BTX) compounds (benzene, toluene and xylene) from petroleum wastewater effluents. Also, using high performance liquid chromatography (HPLC), the sorption behavior of BTX over gAC/KLx biocomposites with different ratios of Kraft lignin ( $x = 33, 50$  and  $67\%$ ) in batch experiments were evaluated. It was noticed that, the gAC/KL showed the highest sorption capacity of BTX at lignin blended ratio of  $50\%$ , even from broad ranges of water salinity (up to  $100,000$  mg/L) and pH values (pH  $4 - 9$ ). The sorption behavior of BTX compounds were found to fit better to a type two pseudo-second kinetic

(adsorption kinetic rate of BTX at  $0.104$  g.mg<sup>-1</sup>.min<sup>-1</sup>) and Langmuir isotherm models, as confirmed by the higher coefficient of  $R^2 > 0.98$ . The sorption affinities of the gAC/KL0.5 biocomposite with respect to  $250$  mg/L BTX can be ordered in the sequence Xylene > Toluene  $\geq$  benzene with highest monolayer capacities reached to  $170.5, 160.5$  and  $159.7$  mg/g, respectively after  $6$  h. The adsorption mechanism was found to follows the diffusion and hydrophobic sorption mechanisms. Particularly, the possibilities of BTX elution for gAC/KL0.5 reuse was evaluated up to five cycles without high significant loss in sorption efficiencies during multiple wastewater treatment. As such, on the basis of batch BTX sorption studies, the gAC/KL0.5 is expected to be a promising low cost and high performance new sorbent to be reutilize for real wastewater treatment process and petroleum hazardous decontamination with higher thermal stability (up to  $350$  oC) and aqueous stability ( $10\% - 21\%$  efficiency loss).

### Biography

Yasser Mohamed Mahmoud Moustafa has completed his PhD in Organic Chemistry, Ain Shams University, Egypt and postdoctoral studies at Department of Analysis & Evaluation, Egyptian Petroleum Research Institute. He has published more than 65 papers in reputed journals and has been serving as Organizing Scientific Committee, Conference General Secretary, Chairperson for Plenary Session, Conference Coordinator for International Conference on "Petroleum & Mineral Resources and Development. Also, he acts as Editor-in-chief of Egyptian Journal of Petroleum.

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