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Abstract

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

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Abstract:

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/KLxbiocomposites 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 behaviorof BTX compounds were found to fit better to a type twopseudo-second kinetic (adsorption kinetic rate of BTX at 0.104 g.mg-1.min-1) and Langmuir isotherm models, as confirmed by the higher coefficient of R2> 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 ≥ benzene with highestmonolayer 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 sorbentto be reutilize for real wastewater treatment process and petroleum hazardousdecontamination with higher thermal stability (up to 350 oC) and aqueous stability (10% - 21% efficiency loss).

Biography:

Prof. Dr. Yasser Mohamed Mahmoud Moustafa has completed his PhD in Organic Chemistry, Ain Shams University, Egypt

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