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The influence of ash tree sawdust acid treatment on the removal of crude oil from water surfaces

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Abstract

Agricultural and timber industry wastes may constitute a significant source of promising oil sorption materials. In this study the potential application of *Fraxinus excelsior* ash tree sawdust as sorption material for crude oil removal was investigated. The effect of acid treatment on physicochemical and sorption properties of sawdust was studied in a batch system. Oil sorption capacity and water uptake of sorption materials in static system were evaluated. For the determination of raw and treated samples structure and surface changes X-ray diffraction analysis, atomic force microscopy, FTIR spectroscopy and contact angle evaluation were used. The highest oil sorption capacity was shown by 3% HNO₃ treated sawdust, 43.2% and 37.4% increase of oil sorption capacity for Devonian oil and Carbon oil, respectively, was observed in comparison with untreated sawdust. The exhibited reduction of modified sawdust water uptake indicated the increase of sorbent material hydrophobicity that was confirmed by the results of contact angle determination. Based on atomic force microscopy results, the surface roughness of treated sawdust was shown to be enhanced that could be a primary factor affecting on oil sorption capacity improvement. Thus, acid treated ash tree sawdust was shown to have improved oil sorption and physicochemical characteristics for crude oil removal.

Keywords

Acid treatment, Ash tree sawdust, Oil sorption capacity, Water uptake