

Salvinia as A Green Solution for Efficient Oil Sorption

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Structured Abstract

Background: The present study is focused on using Salvinia, an invasive aquatic plant, as a bio-sorbent for cleaning up oil spills, thus solving the environmental and economic problems. While the effectiveness of sorption has long been recognized in oil spill cleanups, challenges persist, hence making innovation in sorbent materials. Salvinia is considered unique for this due to its superhydrophobic and super oleophilic characteristics. The present study characterizes Salvinia chemically and physically using FTIR, SEM, and bulk density analysis; evaluates its efficiency in removing oil from pure and mixed oil-water solutions.

Methods: The Salvinia was used as adsorbent in oil clean-up processes. The Salvinia plants underwent the following steps including washing, drying, and grinding to increase the surface area. Vegetable and lubricant oils were used in this study. Characterization of the adsorbent material by FTIR, SEM, and bulk density measurement has been done. In the present study, the Salvinia efficiency in oil removal from oil-water mixtures was tested by varying the adsorbent dosage and soaking time.

Results: The bulk density of 0.5 g/cm³ indicated that the Salvinia sorbent was quite suitable for oil sorption. SEM characterization described the surface morphology of Salvinia, which has folded and hairy structures. FTIR identifies key functional groups like organic acids and phenols. Research into the capacity for oil sorption shows that higher doses of adsorbents generally increase the extent of sorption, although with a decreasing return at very high doses. Similarly, an extended soaking time will increase the oil uptake initially but then shows decreasing returns over longer time.

Conclusion: In conclusion, the findings of this study indicated that there is considerable potential in oil adsorption using Salvinia, thereby offering long term environmental advantages. In this study, the sorption capacity of lubricant oil higher than vegetable oil due to their viscosity. The maximum value of sorption capacity for Salvinia sorbent about 5 g/g at 9 minutes soaking time.

Keywords: Oil sorption, salvinia, oil spills, bulk density, FTIR

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