Evaluating Chemically Enhanced Natural Materials for Oil Spill Cleanup

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In the recent decades, oil spill pollution has become a prevalent issue due to its adverse environmental effects. Current cleanup procedures while effective, aren't environmentally sustainable and contribute to secondary contamination. This experiment analyzes natural sorbent treatment methods to increase efficiency in oil spill cleanup while accounting for environmental aspects. Synthetic sorbents are very effective in cleanup, but they aren't biodegradable leading to problems for their disposal. Natural sorbents are viable options due to their low-cost, availability, biodegradability and reusability. The sorbents used are kapok, coco peat, cotton, and moss peat. It was hypothesized that acetic acid treated would have the highest oil sorption. Indicators for efficient spill cleanup are oil sorption, retention, and reusability. To combat hydrophilicity present in natural materials, the sorbents were treated with NaOH and acetic acid to increase hydrophobicity. To simulate an oil spill, a standard container and 450mL of water were used for every test with varying conditions of spill size (50mL, 25mL, and 10mL). The sorbent was shaken in the oil spill on a shaker plate for 5 minutes, drained in a graduated cylinder, and left to gravity drip over a scale for 5 minutes. Two sorbents out of every ten were saved to perform reusability tests. Overall, kapok fiber had high oil sorption, reusability, and retention rates that was further enhanced with acetic acid. Kapok is relatively unknown and unused in this field and there are major possibilities for kapok to become a new standard of use for oil spill cleanup.

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