Developing an Oil Spill Remediation System That Utilizes Ferrofluids' Polar-Incongruencies to Bind to Petroleum and Integrate It Into a System Primed for Magnetic Removal vs. Bagasse, Coconut Coir, and Pine Shaving Remediation Systems for Sustainable Energy Regeneration

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Cleaning oil spills is a significant problem, especially in open-water systems. Many current remediation methods are expensive, not entirely effective, or are more detrimental to the environment than the actual spill. This research aimed to find an effective material for oil remediation that would be easy to implement and create a scaffolding for the material to show possibilities of automating future remediation. The absorbance of 1 gram of bagasse, coconut coir, pine shavings, and 0.5 mL of ferrofluid was tested in 40 mL of salt water and 5 mL of vegetable oil. For each material, eight trials stayed in the oil for 30, 45, or 60 minutes. A single-factor ANOVA and post hoc Tukey's Range Test were run. These showed no evidence of difference between the ferrofluid and control groups; the other materials showed statistical significance with p-values of less than 0.01 when compared to the control group. The bagasse group had an average drop in oil of 3.04 mL, the coconut coir group had an average drop of 4.79 mL, and the pine shavings group had an average drop of 4.9 mL. The single-factor ANOVA showed no evidence of difference between coconut coir and pine shaving groups, with a p-value of 0.88, meaning they are equally effective at absorbing vegetable oil. More research will need to be conducted on coconut coir and pine shavings, but both appear to be exceptional options for future oil remediation as they are effective and natural byproducts of different industries.