

A Comparison of the effectiveness of modified natural fiber for oil spill cleanup in Niger Delta, Nigeria

(ナイジェリア, ニジェールデルタにおける流出油を浄化できる天然繊維の有効性比較)

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[Introduction] In the oil rich Niger Delta, incessant cases of oil spills has led to very disastrous consequences for the environment. In spite of the collaborative effort by the oil companies and Government agencies in tackling these spills, the problem is far from been solved. According to our interview research conducted with the Government regulatory Agencies and some oil companies, about four spills is reported every day these past years mainly on land due to sabotage and pilfering of crude oil and this have been on the increase. Therefore prompt oil spill cleanup methods using cheap readily available materials managed by local host communities would be preferable as a solution to the high cost of oil spill cleanup using industrial standard material like polypropylene. Hence the aims of the study is to identify relatively cheap and available materials that effectively cleanup crude oil spills and can also be easily employed by the community in the study area.

[Method] We have compared the sorption efficiency of Potato peels, banana peels, corn cob, egg shells & soya beans chaff, wheat, guinea corn, moringa, sorghum, vermiculite, magnetite and activated charcoal grouped into food waste, food grains and non-food inorganic categories. All these was subjected to acetylation using acetic anhydride with Perchloric acid as catalyst, and also modified with Stearic acid dissolved in methanol. The effectiveness of these modifications was determined by comparing oil sorption results with a set of unmodified materials. BS 2869 C2 Kerosene was used as the pollutant and its weight absorbed was compared with the weight of water for each of the material.

[Results and Discussion] The result revealed that acetylated (soya bean chaff, potato peels & moringa) and Stearic acid + methanol treated (magnetite, vermiculite and egg shell) have higher oil/water ratio ranging between 2.000 for acetylated Potato peel and 3.785 for Stearic acid + methanol treated Magnetite, and hence these holds greater potential for oil spill cleanup for the materials studied. And so these materials should be developed for oil spill cleanup in the study area, especially acetylated potato peel, acetylated soya bean chaff with oil/water ratio of 2.228, and stearic acid + methanol treated egg shells with oil/water ratio of 2.807 as these are waste products and so will be relatively inexpensive.