UNIVERSITI TEKNOLOGI MARA

OIL SPILL TREATMENT USING ADSORBER FROM NATURAL ORGANIC MATERIALS

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ABSTRACT

Three types of natural materials were studied to produce low cost oil spilled adsorber i.e. rice husk, peat and coconut dreg. The raw materials were carbonised before soaking with 1 M HCl or methanol. Carbonisation temperatures and times were varied from 300°C, 400°C, 500°C, and 600°C for 2, 3, and 4 hours. The adsorption properties of charcoals produced from different treatments and materials were compared with each types of untreated charcoal as standard. The quality of charcoal was determined by measuring the BET surface area, iodine number, methylene blue number, and oil spill adsorption. Charcoal treated with methanol exhibit higher surface area and good quality as compared to those treated with 1 M HCl and untreated. Results show that the rice husk charcoal soaked with methanol is superior and suitable as oil spill adsorber than those of other eight types of charcoals produced. The yield of rice husk charcoal obtained is from 40% to 61%, and the highest fixed carbon obtained is 55.1%. The BET surface area, iodine number, methylene blue number, and oil spill adsorption obtained are 220.04 m^2g^{-1}, 371.15 mg/g, 30.44 ml/g and 8.04 g of oil, respectively. It is suggested that the carbonisation process, method of treatment and types of raw materials are responsible for the quality of charcoal produced.

CHAPTER 1

INTRODUCTION

In many parts of the world, crude oil exudes from outcrops at the surface. Oil tankers may transport crude petroleum from the oilfield to the refinery, or refined products from the refinery to or between depots. The transportation of petroleum products represents more pollution risk than a general cargo vessel. Oil persist when spilt, causing pollution problems of ocean and environmental destruction, because crude and residual fuel oils are incompatible with refined material. Sometimes, most of the oil affecting marine ecosystems derives from tanker operations such, as cleaning compartments and accidents, with incidents at production installations being less significant. For transporting of petroleum-derived oils as cargo, vessels carry a verity of heavy fuel oil and lubrication and it may present a significant pollution if accidents happen (Smith, 1972).

The number of oil spill accidents has been raised drastically due to the increase of traffic in the ocean, especially at the near shore area in the vicinity of harbours and straits. About 5 percent of oil pollution in oceans is due to major tanker accidents, but one big spill can disrupt sea and shore life for miles. In the event of a spill of fresh crude or light refined product the risk of explosion and fire might also be sufficiently severe during the early stage to disrupt ship movement, lock operations and industries such as shipbuilding (Mackay et al., 1980). When oil spill accidents occur, it is essential to identify the actual situation in the spreading of the spilled oil to prevent its further spread. The most urgent work to do after the oil spill accident is to set up oil fences to prevent oil from spreading and also for efficient clean-up operation. The environmental conditions, the type of oil spilled, and its physical-chemical characteristics influence many aspects of oil pollution, such as the thickness and spreading of oil slick. Oil pollution is defined as any oil impairment of