REFINING OF INDUSTRIAL SPENT FUEL OIL BY REMOVAL OF HEAVY METALS IMPURITIES USING NANOPARTICLES ADDITIVES

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BY

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Sincerely,

Nur Nadhirah Juliana Binti Jasmani

TABLE OF CONTENTS

ABSTRACT

The use of lubricating oil is one of the main demands since transportation is constantly developing and one of the functions of lubricating oil is to prevent corrosion of transportation parts. However, lubricating oil will continue to be used until it runs out, at which point it is referred to as waste oil. Usually, it will be disposed of as it cannot be used again. Waste oil does include a number of pollutants, including heavy metals. In order to have a decent environment, the pollutants should be eliminated or minimized before it is disposed of. Adsorption is a technique that may be utilized in future research to minimize or eliminate pollutants, and in recent studies, heavy metals in used oil were extracted using magnetic nanoparticles. Previous study has demonstrated that employing magnetic nanoparticles can enhance and improve a product's quality and attributes. As a result, iron oxide (Fe2O3) nanoparticle is created in this study on a laboratory scale using the co-precipitation technique. The alkaline precipitate, consisting of iron (II) chloride and iron (III) sulphate anhydride, is combined with sodium hydroxide dropwise into hydrochloric solution. Two different temperatures, 80 and 85 °C, were used to agitate the mixture for an hour each. After the solutions have been combined, the magnetic nanoparticle will be created by repeatedly washing it before being dried in an oven at 50 °C for four hours and overnight. The magnetic nanoparticles are next tested for their features using four different pieces of apparatus: FTIR, TGA, BET, and XRD. For FTIR, the iron-oxygen (Fe2O3) caused two distinct peaks to emerge at 598 cm^{-1}, verifying that the generated nanoparticles are iron oxide. The TGA at 80 °C revealed that the sample had lost roughly 3% of its weight at a temperature of about 60 °C. At an ambient temperature of 80 °C, the same iron oxide was measured and reported in BET with values of 99.7087 m2/g, 0.128887 cm3/g, and 5.2661 nm for surface area, pore volume, and pore diameter, respectively. Last but not least, the XRD pattern for MNPs showed magnetic characteristic peaks at 80°C, 35, 56.4, and 62.3°.