

Recovery and characterization of used lubricating oil using acid with two different adsorbents

ABSTRACT

This study is a form of experimental analysis that utilizes used lubricating oil (ULO) in order to reclaim base oil by using a combination of acetic acid and two different adsorbents namely aluminum oxide (Al₂O₃) and river sand (RS). The two different adsorbents were used to compare for better quality of oil using the same method. The characterization of the recovered ULO samples was conducted by using Fourier-transform infrared spectroscopy (FTIR) and the viscosity was tested by using the viscometer. Based on the results obtained, the Al₂O₃ seems to be a better adsorbent than RS in several tests such as density, sludge removal and viscosity. For better viscosity and mass of sludge values, the Al₂O₃ adsorbent is more suitable compared to the RS. It was found that by using Al₂O₃, there is a 26% viscosity reduction for ULO samples. By using RS, 6.67% viscosity reduction was found for ULO samples. 24.9% and 25.7% of sludge removal was found in ULO samples by Al₂O₃ and RS, respectively. FTIR analysis showed that before treatment oxidative compounds such as alkenes and halides were present in the ULO and UEO samples. However, after treatment by both of the adsorbents, the oxidative compounds were removed. The removal of the alkenes and alkyl halides has evidently indicated the treatment was able to remove the oxidative compounds in the oil.