

Recovery Of Used Lubricating Oil by Glacial Acetic Acid with Two Different Activated Carbons

ABSTRACT

Recovery of used lubricating oil (ULO) generally comprises cleaning, drying, and adsorption in order to eliminate water, sludge, and impurities. As the ULO is one of the hazardous wastes generated in various industrial and automotive industries, it should not be used or disposed of in ways that are harmful to the environment. The main purpose of this study was to investigate the effectiveness of two different types of activated carbons (ACs) which are coconut AC (CAC) and rice husk AC (RHAC) in recovering the ULO. Glacial acetic acid was used in the acid treatment as it does not react with the base oils, and the ACs were substituted with the clay used in the clay treatment. The recovered oil was analysed through analytical characterizations, which are Fourier transform infrared spectroscopy (FTIR), ultraviolet-visible (UV-vis) spectroscopy and atomic absorption spectrometry (AAS). FTIR analysis revealed that the properties of the untreated ULO samples improved by removing the carbonyl compounds. In terms of metal removal, RHAC had shown better performance than CAC as it gave low metal contents in AAS. The response surface methodology (RSM) was used to study the optimum process parameters that would maximise the efficiency of the process. There are two factors that were manipulated, which are the weight of adsorbent (A) and speed of mixing (B). For CAC, the optimum value of factors A was 4.00 g while the B was set to 524.89 rpm. Meanwhile, for RHAC, the optimum value of factors A was 2.29 g while the B was set to 4000 rpm. CAC has higher desirability with 0.83 compared to RHAC with 0.69.