NEUTRALIZATION OF NAPHTHENIC ACID FROM PETROLEUM CRUDE OIL BY USING CERIUM OXIDE CATALYST AND 2-METHYLIMIDAZOLE IN POLYETHYLENE GLYCOL

NORFAKHRIAH BINTI JELANI

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ABSTRACT

NEUTRALIZATION OF NAPHTHENIC ACID FROM PETROLEUM CRUDE OIL BY USING CERIUM OXIDE CATALYST AND 2-METHYLIMIDAZOLE IN POLYETHYLENE GLYCOL

The presence of relatively high naphthenic acid in crude oil may contribute to the major corrosion in oil pipelines and distillation units in crude oil refineries. Thus, high concentration NA crude oil is considered to be of low quality and is marketed at lower prices. In order to overcome this problem, neutralization method had been develop and used to reduce the TAN value in crude oil. In this study, crude oil from Petronas Penapisan Melaka was investigated. The parameters studied were reagent concentration, catalyst loading, calcination temperature and reusability of the potential catalyst. Basic chemical used were 2-methylimidazole in polyethylene glycol (PEG 600) with concentration 100, 500 and 1000 ppm. Cerium oxide based catalysts supported onto alumina prepared with different calcination temperatures. The catalyst was characterized by using Brunauer-Emmett-Teller (BET), Fourier Transform Infrared Spectroscopy (FTIR) and Thermogravimetry Analysis-Differential Thermal Gravity (TGA-DTG) to study physical properties of the catalyst. The FTIR result for the catalysts at all calcination temperature shows a peak in the range 590.40 cm^{-1} - 566.73 cm^{-1}. This was due to the stretching mode of metal oxide group while the FTIR result for Ce/Al_2O_3 after the reaction was shown the another peak was appear in the band 2922.78-2853.08 cm^{-1} which is represent by the C-H (sp^3,stretching) of the alkane group. For TGA, the impurities and the water from the catalyst have been removed by thermal treatment. All the nitrate compound originated from the metal precursor was removed. The Ce/Al_2O_3 catalsyt calcined at 1000°C was the best catalyst due to larger surface area formation that will lead to increment of active sites and thus will boost the catalytic activity. The result showed that the Ce/Al_2O_3 catalyst meet Petronas requirement as the TAN value reduced to 0.6 mgKOH/g from original TAN value of 4.22 mgKOH/g. The best reduction of TAN was achieved by using catalyst loading of 0.39% and reagent of 1000 ppm.