DEACIDIFICATION OF NAPHTHENIC ACIDS FROM PETROLEUM CRUDE OIL USING 2-METHYLIMIDAZOLE WITH THE AID OF Ni/Ce AND Cu/Ce CATALYSTS

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ABSTRACT

DEACIDIFICATION OF NAPHTHENIC ACIDS FROM PETROLEUM CRUDE OILS USING 2-METHYLIMIDAZOLE WITH THE AID OF Ni/Ce and Cu/Ce CATALYST

The presence of the carboxylic acid derivative compound in crude oil can contributes to the major corrosion in oil pipelines and distillation units in crude oil refineries. The acidity level in crude oil is measured by the Total Acid Number (TAN). Methods that commonly used to remove naphthenic acid (NA) from crude oil such as dilution and caustic washing have its own weakness such as emulsion formation, high temperature and huge solvent usage. In order to overcome this problem, catalytic deacidification method had been developed and used to reduce the TAN value in acidic crude oil utilizing the basic chemical with the aid of an alkaline earth metal catalyst. In this study, crude oil from Petronas Penapisan Melaka was investigated. The parameters studied were reagent concentration, reaction temperature, catalyst loading, calcination temperature and reusability of the potential catalyst. Basic chemical used were 2-methylimidazole in polyethylene glycol (PEG 400) with concentration of 100, 500, 1000 and 1500 ppm. Alkaline earth metal used as a base for the catalyst was Cerium (Ce) where Ni and Cu act as dopant. The catalyst with the lowest TAN value was undergo characterization methods such as Fourier Transform Infrared Spectroscopy and Thermogravimetry Analysis for its physicochemical properties. The result showed that the Cu/Ce catalyst meet Petronas requirement as the TAN value reduced to 0.93 mg KOH/g from original TAN value, 3.93mg KOH/g. As for Ni/Ce catalyst, the TAN reduction was from 3.93 to 1.03 mg KOH/g. For TGA, the total weight loss of Cu/Ce=23.40% and Ni/Ce=25.22% due to the complete removal of the impurities in catalyst. Reaction temperature used was 27℃ with catalyst calcination temperature of 1000℃ and 7 beads of catalyst loading. It can be concluded that catalytic deacidification method with the aid of Cu/Ce was efficient in removing NA from the acidic crude oil thus lowering the TAN value less than 1 mg KOH/g.

TABLE OF CONTENTS

LIST OF FIGURES