CHARACTERIZATION OF THE STRUCTURE OF SAUDI CRUDE ASPHALTENES BY X-RAY DIFFRACTION

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ABSTRACT

Structural characterization studies have been carried out on four commercial Saudi Arabian crude oils. The aromaticity and crystallite parameters of the asphaltenes were studied by x-ray diffraction methods and compared to the average structural parameters calculated from nuclear magnetic resonance spectra.

INTRODUCTION

The long term future outlook for the hydrocarbon conversion industry is to utilize the heavier and more carbonaceous feedstocks. Such feedstocks are characteristically more difficult to process because they contain substantial amounts of asphaltenes. Asphaltenes are defined as material insoluble in aliphatic hydrocarbon solvents (n-pentane and n-heptane). In general, asphaltenes have higher aromaticity, heteroatom contents, metal contents, and molecular weight as compared to lighter petroleum fractions and are thereby commonly presumed to represent the most refractory and difficult portion of the feedstocks to process. The molecular species that constitute asphaltenes have been a subject of active research over the past thirty years. These investigations have brought to light some significant facts about asphaltene structure. There is a general consensus of the majority of the researchers that asphaltene contains condensed aromatic systems carrying alkyl, cycloalkyl, and heteroatom constituents [1-3].

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