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New Reactor Design Used For Liquid Extraction of Aromatic Compounds from Petroleum Feed Stocks

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Abstract

The process of removing aromatics from mixtures of hydrocarbons is essential to the petroleum refining industry. In commercial extraction procedures, aromatics are extracted from aliphatics using a variety of solvents with a high boiling point, high density, and high polarity, such as sulfolane, glycols, N-methylpyrrolidone (NMP), N-formylmorpholine (NFM), and dimethylsulfoxide. Desired characteristics of extraction solvents include high capacity, rapid phase separation, the capacity to separate into two phases at temperatures of extraction, aromatic selectivity, robust thermal stability, and non-reactive and non-corrosive qualities. A novel reactor design for the liquid extraction of aromatic chemicals from petroleum feedstocks was employed in this investigation. Western desert crude oil is the source of medium and heavy waxy distillate, which are the feedstocks utilized. Investigations were conducted into the effects of temperature, crude to NMP solvent ratio, mixing time, and mixing speed variations.

The operational conditions under investigation were the extraction temperature, which varied between 65°C and 80°C, with 70°C being the ideal temperature. The optimal mixing duration was 30 minutes, although it ranged from 15 to 60 minutes. The ideal solvent-to-oil ratio was 1.2:1, with a range of 1.1:1 to 1.4:1 (wt/wt). 600 rpm is the ideal mixing speed

The values were calculated in two mathematical equations extract based on the solvent concentration values and other values..

The study's conclusions showed that raising the solvent to oil ratio increased the production of aromatic extract while decreasing the amount of raffinate and improving quality for both distillates (lower refractive index and sulfur content). The same effect was observed when extraction temperature is increased. Mixing time also showed the previous results. Finally, rotation speed also showed the same results.