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The Catalysis of Delayed Petroleum Coking

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ABSTRACT

Due to the decreasing crude oil quality (heavier crudes and increasing contaminant concentrations) methods for upgrading residues from the refining process, such as coking, are becoming increasingly important. Delayed coking, a method by which residues are thermally cracked (large heavy molecules broken into smaller lighter molecules), produces liquid products and solid coke which can both be sold for further profit. In order to increase the amount of liquid products produced since they are the most value added product of the coking process catalysts (platinum on 0.5% alumina and nickel (skeletal), molybdenum promoted (1 wt%)) were tested to see how they would affect the process and products. Different ratios of vacuum residue, light gas oil, heavy gas oil, and catalyst were all loaded into a semi-batch reactor which operated under a nitrogen environment at 15 psi. Each ratio of components was tested at 450°C, 475°C, and 500°C. Gas chromatography based on ASTM D2887 was used to analyze gaseous products every 15 minutes during each test and the liquid products at the end. Testing is still ongoing and preliminary results have yet to be obtained. Due to the increased value of liquid products, catalysts and conditions which produce more of those are favored. Further research into these and other catalysts is recommended since residues from different crudes could interact differently with the catalysts.

KEYWORDS

Delayed coking, petroleum, catalysis, petroleum upgrading, light gas oil, heavy gas oil, vacuum residue