The catalytic pyrolysis of the Egyptian bitumen for industrial production raw material

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Mostafa, BS (Mostafa, BS)

Abstract

As long as gasoline is the main transportation fuel and residual fuel oil value is priced below crude oil, refiners will continue to convert heavy fractions to lighter products. Future challenges to this process will evolve around the development of more economic pretreatment processes to handle very heavy feeds and improve catalyst cost and the development of a better understanding of catalyst deactivation and regeneration. These residues contain metallic contaminants and asphaftenes that concentrate through distillation and have a tendency to coke on pyrolysis.

Many methods have been introduced to overcome these problems. One of these approaches is the pyrolysis of vacuum residues using a batch-type reactor having two different reaction zones controlled at different temperatures: 400-500 and 500-700 degrees C, respectively. Vacuum residues are pyrolyzed in the first low-temperature stage to produce cracked oils using Pt as a catalyst. An argon flow then carries the cracked oils to the second high-temperature stage for subsequent catalytic pyrolysis. Because pyrolysis residues are left behind in the first stage, the catalyst used in the second stage is not affected by these metallic contaminants. The procedure is defined as "two-stage pyrolysis". This method has proved to be excellent for production of C-2-C-4 olefins.
The present work is an attempt to investigate the catalytic two-stage pyrolysis of bitumen 80/100, using Ca2+ catalyst with the intention of producing unsaturated hydrocarbons. The maximum yield of the unsaturated hydrocarbon is 33.6 wt%.
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METAL-CATALYZED 2-STAGE PYROLYSIS .2. ROLE OF DIFFERENT CATALYSTS IN THE PRODUCTION AND COMPOSITION OF ETHYLENE/PROPYLENE-ENRICHED GASES

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Abstract

The effect of different types of boat (nickel, copper and porcelain) on the pyrolysis of vacuum gas oil in the first stage of the two-stage pyrolysis technique has been examined. The best yield of total unsaturated hydrocarbons was obtained by using a nickel boat. The ethylene pyrolyzate yield is 40.2 wt.%, using a nickel boat, and the severity function of the second stage is 1384, The ethylene pyrolyzate yield is found to be directly proportional to the second-stage severity function. However, the propylene and butylene yields are found to be inversely proportional to the second-stage severity function. The maximum yield of unsaturated hydrocarbons is 65.9 wt.%.

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Pyrolysis Theory and Industrial Practice

UPGRADING HEAVY ENDS INTO MARKETABLE PRODUCTS - NEW CONCEPTS AND NEW CATALYSTS FOR 2-STAGE CATALYTIC PYROLYSIS

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IBRAHEAM, NN (IBRAHEAM, NN)

Abstract

A two-stage pyrolysis technique for the catalytic pyrolysis of a heavy distillate separated from Egyptian crude oil has been investigated. Five different catalysts were used (silica-alumina, amorphous silica-alumina impregnated with 2.5 wt.% La2O3 as a promoter, Degussa silica-alumina containing 20% alumina, 13X Zeolite, and chromia-alumina), as well as a series of reaction temperatures, reaction times and contact times. Two-stage catalytic pyrolysis using a chromia-alumina catalyst provides multiple advantages over non-catalytic two-stage pyrolysis techniques previously employed. The use of a chromia-alumina catalyst not only improved the yield of total unsaturated hydrocarbons (up to 45.1 wt.%) but also provided selectivity in the final products, as is reflected in the production of isopentane in a marketable amount (6.0-8.7 wt.%).

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Web of Science Categories: Chemistry, Analytical; Spectroscopy
Research Areas: Chemistry; Spectroscopy

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EFFECTIVENESS OF SOME CR2O3/AL2O3 CATALYSTS, PRECIPITATED AT DIFFERENT PHS, ON THE YIELD OF THE 2-STAGE PYROLYSIS PROCESS

BASILY, IK (BASILY, IK); ISSAC, YA (ISSAC, YA);
GALAL, S (GALAL, S)

Abstract

The two-stage pyrolysis technique for catalytic pyrolysis of heavy distillate separated from Egyptian crude oil has been carried out using some chromia-alumina catalysts. The catalysts were prepared at different pH's (viz. 6, 6.3 and 7.5) it was found that the pH deeply influences the pyrolyzate distribution, where (1) the lower the pH the lower the gaseous hydrocarbons pyrolyzate C1 and C2 (2), the higher the pH the lower the gaseous hydrocarbon pyrolyzate (> C2). Using of the catalyst prepared at pH = 6.3 the ratio of unsaturated/saturated hydrocarbons reaches 3.1 this high ratio plays a great role in petrochemical industry.

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Author Keywords: PYROLYSIS; 2-STAGE PYROLYSIS; CATALYTIC PYROLYSIS AND PYROLYSIS OF HEAVY DISTILLATES
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Web of Science Categories: Chemistry, Multidisciplinary
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Source: J APPLIED SCI Volume: 1 Published: 1991

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Author(s): BASILY, IK; THAMER, K
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Author(s): BASILY, IK; BARAKAT, Y; IBRAHEEM, N
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Author(s): BASILY, IK; AHMED, E; NASHED, N
Source: JOURNAL OF ANALYTICAL AND APPLIED PYROLYSIS Volume: 17 Issue: 2 Pages: 153-167 DOI: 10.1016/0165-2370(90)85029-M Published: APR 1990

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Author(s): BASILY, IK; SOUAYA, ER; IBRAHEEM, NN
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2-STAGE PYROLYSIS OF VACUUM GAS OIL

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MAHMOUD, SG (MAHMOUD, SG)

Abstract

The catalytic two-stage pyrolysis of the vacuum gas-oil (V.G.O.) was carried out with the intention of producing ethylene and propylene. The maximum yield of ethylene and propylene, achieved at second-stage severity function equal almost-equal-to 1313, vis. 30.1, 22.5 wt% respectively. The calcium aluminate, CaO/Al2O3, 1% promoter was used as a catalyst. The unsaturated hydrocarbons has been doubled three times more than any other technique.

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Author(s): BASILY, IK; SOUAYA, ER; IBRAHEEM, NN
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Inventor/Assignee: BECKER K

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Inventor/Assignee: DAVIS PT

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