

## Optimization of a pilot hydrocracking unit to improve the yield and quality of jet fuel.

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### Highlights

- Study the yield and quality of jet fuel on four operation modes.
- Commercial catalysts were employed in respective processes.
- The FRTHC operation mode exhibited the highest smoke point of 33 mm.
- The FRTHC operation mode presented the highest jet fuel yield of 46.71%.

### 1. GENERAL GUIDELINES

A pilot hydrocracking unit was operated by four modes to investigate the change of the yields and qualities of products, including light naphtha, heavy naphtha, jet fuel, diesel and unconverted oil. Main properties of these products were tested by various method, including ASTM D 2425, SH/T 0606, GB 6537-2006, ASTM D86, and so on. The results showed that circulation modes of FRTHC and FRTHC could produce more middle distillation fractions of jet fuel and diesel. Meanwhile, the compositions of paraffins in light naphtha for FRTHC and FRTHC operation modes were higher than other modes. Moreover, all heavy naphtha with high amount of cyclane and aromatics could be applied as a good high-quality gasoline blending component after catalytic reforming. As for diesel fraction, the cetane number for FRTHC operation mode was highest of 66.7. In addition, FRTHC and FRTHC operation modes should be preferred to produce ethane from unconverted oil. The influence of distillation cutting scheme on the yield and quality of jet fuel was also investigated for maximum qualified jet fuel product. The results showed that the jet fuel obtained by FRTHC operation mode exhibited the highest smoke point of 33 mm, and the FRTHC operation mode also presented the highest jet fuel yield of 46.71%.

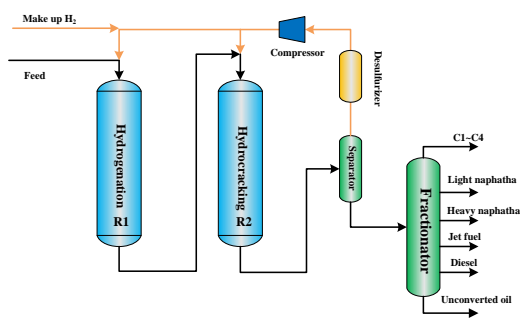


FIG. 1. Single stage once through process (SSOTP).

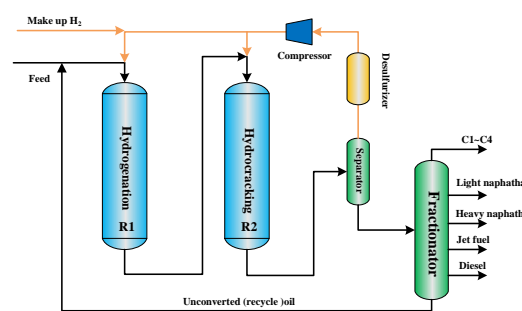


Fig. 2 Process of full unconverted oil recycled to hydrogenation reactor (FRTHC).

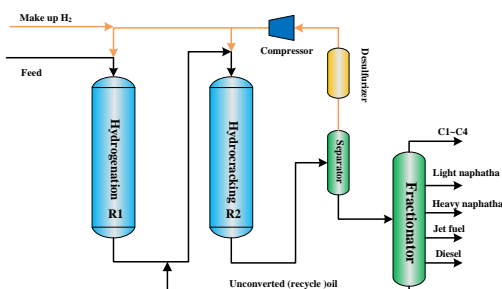


Fig. 3 Process of Full unconverted oil recycled to hydrocracking reactor for (FRTHC).

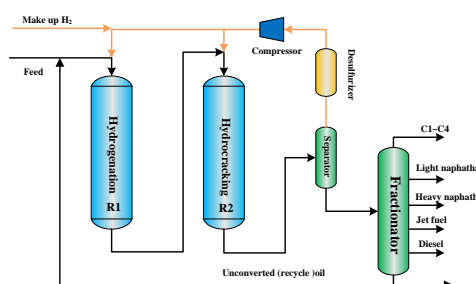


Fig. 4 Process of partial unconverted oil recycled to hydrogenation reactor (PRTHC).

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## Keywords

Jet fuel; hydrotreating; hydrocracking; catalyst; yield