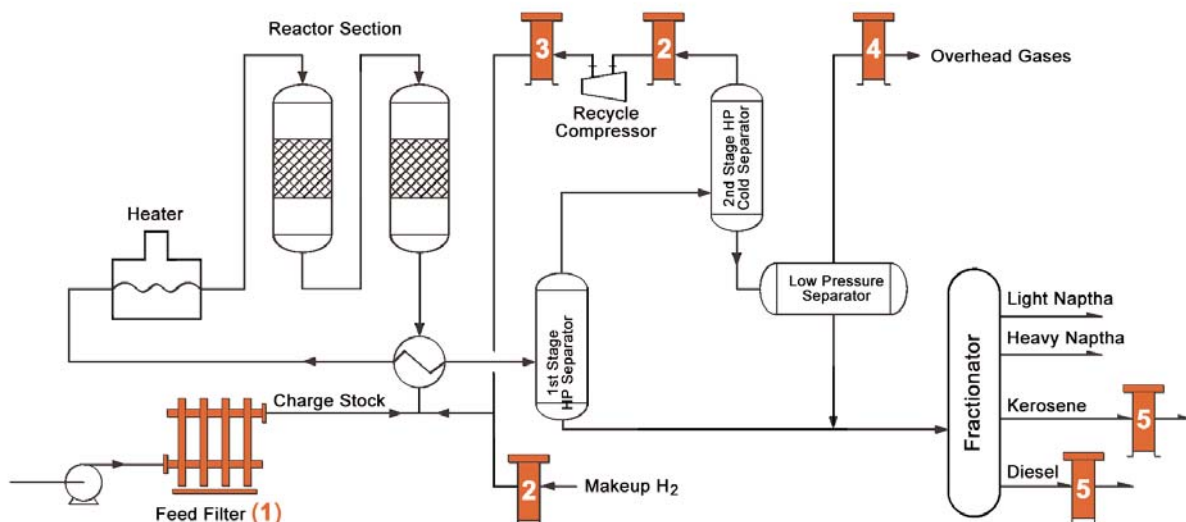


## Hydrocracking



Hydrocracking processes are used to convert heavy oil fractions to products of lower molecular weight. In this process the hydrocarbon feedstock is saturated with hydrogen at relatively high pressure in a fixed catalyst bed in order to remove the nitrogen, sulfur and oxygen contaminants prior to cracking the feedstock into lighter products. Typical feedstocks for the hydrocracking process range from C3/C4 production from naptha to Lube Oil production from deasphalted oil.

### Operational Problems

1. Heat exchanger fouling
2. Reactor bed plugging or fouling
3. Hydrogen contamination
4. Final product contamination

These operational problems degrade hydrocracking performance and can lead to off-spec. fuels, premature unit shutdown and significant increased operating cost for the process unit.

### Solutions

1. A particulate filter typically located between the process unit feed pumps and the first stage heat exchangers will address the fouling and reactor plugging problems. The feed volume and type of hydrocarbon being processed will dictate the type of filter equipment required. The particulate filter may be an automated ProGuard Filtration Systems 4000 Series Feed Filter for moderate to high flow rate conditions or a Nowata Filtration Cartridge Filter for low to moderate flow rate conditions. Typically Gas Oil Hydrocrackers require at least 25 micron filtration. While Distillates and Naptha typically require 5-10 micron filtration.

2. Hydrogen is continuously recycled in both stages of the hydrocracking process. The recycled hydrogen used in the process is recovered from the first stage High Pressure Separator and sent to the second stage Cold High Pressure Separator after it is water washed to remove ammonia created in the reactor. A Nowata Filtration Coalescer using 0.3 micron NFF coalescing filter elements should be used to remove carry-over hydrocarbons from the unused hydrogen recovered from the second stage Separator prior to the H<sub>2</sub>S Absorber and the recycle compressor and for the hydrogen make-up system.

3. A Nowata Filtration Coalescer using 0.3 micron NFF coalescing filter elements should be used immediately after the recycle compressor to remove lube oils from the hydrogen that are introduced during the compression process.

4. A Nowata Filtration Coalescer using 0.3 micron NFF coalescing filter elements should be used to remove any trace hydrocarbon liquids from the overhead gasses removed from the Low Pressure Separator to prevent contamination of the amine in the hydrogen recovery unit.

5. A Nowata Filtration Liquid - Liquid Coalescer should be used to remove any trace water contamination from the final products (typically diesel and kerosene) as a final treatment prior to transportation (See Final Products).



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