



UOP VGO Unionfining™ Process

Refining

The UOP VGO Unionfining process is a fixed-bed catalytic hydrotreating technology that reduces the contaminant contents of vacuum gas oil boiling range feedstocks, including straight-run vacuum gas oil, heavy coker gas oil, and visbreaker gas oil.

The typical application of the VGO Unionfining process is FCC feed pretreatment. Hydrogen addition to and sulfur removal from the FCC feed provides higher yields and quality of FCC gasoline and lower yields of FCC light and heavy cycle oils. Product from the VGO Unionfining process can also be used as low sulfur fuel oil. As a byproduct of the hydrotreating reactions, there is some conversion of feed to naphtha and diesel products.

Process description

The VGO Unionfining process is a fixed-bed hydrogenation process that uses base metals catalysts to remove contaminants, such as sulfur, nitrogen, organometallics, asphaltenes, and increase the hydrogen content of the products.

As required to meet processing objectives, the feedstock is filtered before combining with hydrogen and passing through the catalyst beds at elevated temperatures. Typically, two to three catalyst beds within a single reactor are sufficient to complete the required reactions. The number of beds and catalyst volume will vary depending on feedstock properties and product objectives.

The reactor effluent, which contains the products, recycle gas, and byproducts, is then separated into the desired products through a combination of separators, flash stages, and eventually, fractionation equipment. The hydrogen recycle gas typically

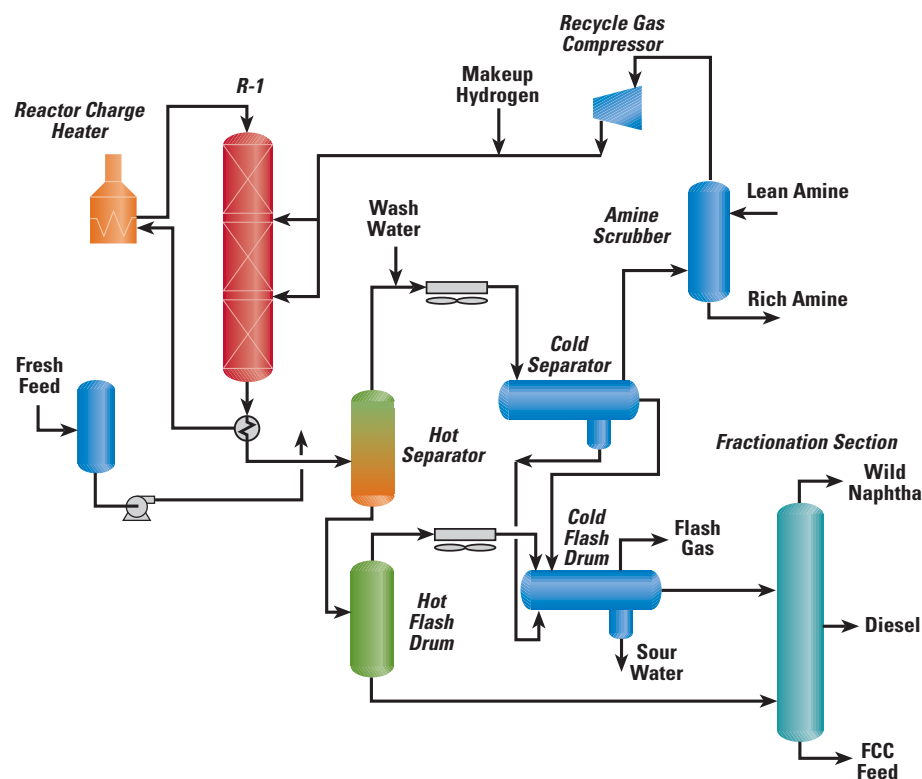
requires scrubbing to remove H_2S . Scrubbed recycle gas is combined with make-up gas before being recycled to the reactor (Figure 1).

Good flow distribution in a trickle-bed hydrotreater reactor is critical to both performance and safety. Poor flow distribution can result in an uneven temperature rise in the reactor, which can ultimately lead to shorter catalyst life, hot spots, and product instability. Proprietary UOP reactor internals are specified to ensure excellent distribution and quench zone mixing.

Impact of feedstock quality and processing objectives

The ease of processing a given feedstock depends on the crude source and the percentage of cracked stock in the feed blend. Relative processing severity is dependent on feedstock type and processing objectives. Consequently, the process operates over a large range of operating conditions, 800-1800 psig and 0.5-3.0

VGO Unionfining Process Flow Scheme



LHSV. Feedstocks with high levels of contaminants, such as heavy coker gas oil, will require higher pressures and lower space velocities.

Hydroprocessing alliance

In 2006, Albemarle and UOP created the Hydroprocessing Alliance to deliver the most comprehensive portfolio of processes, catalysts, equipment and services. This unique collaboration of resources enables UOP to offer the Unionfining technology featuring process and catalyst improvements based on the strengths of Albemarle and UOP.

Catalyst selection

As a result of the Hydroprocessing Alliance collaboration, UOP is able to offer refiners a range of catalysts to meet the specific requirements as dictated by the feedstock and processing objectives. These catalyst choices include guard catalysts to protect downstream catalysts from metals or other contaminants (such as Si, As, etc.) all the way to high activity catalysts that provide deep desulfurization and/or denitrogenation capability. Catalyst loadings are designed utilizing the wide portfolio of catalysts available from the Hydroprocessing Alliance to provide optimum performance.

For more information

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