Honeywell UOP

PETROCHEMICALS

UOP Oleflex™ Process for Propylene Production

Propane dehydrogenation

Introduction

The UOP Oleflex process is a catalytic dehydrogenation technology for the production of light olefins from their corresponding paraffins. The most widely used application of this technology produces propylene from propane. Propylene is the word's second largest petrochemical commodity and is used in the production of polypropylene, acrylonitrile, acrylic acid, acrolein, propylene oxide and glycols, plasticizer oxo alcohols, cumene, isopropyl alcohol, and acetone. The growth in propylene production is primarily driven by the industry demand for polypropylene, which is used in such everyday products as packaging materials and outdoor clothing. The growth rate of polypropylene is expected to be 4% per year for the forseeable future. The Oleflex process provides:

- Low feedstock consumption and low energy usage
- Dedicated reactor and regenerator systems
- Highly active and stable catalyst
- High on-stream factor
- Ability to change catalyst without stopping propylene production

In addition, the Oleflex process utilizes UOP's proprietary equipment and systems for optimal operations, including Polybed™ PSA units, Modular CCR units, Lock Hopper Control Systems, MD™ distillation trays, High-Flux™ tubes, and Callidus burner technologies. Integration of these products within the Oleflex process results in significant capital and operating cost savings for the complex, and helps ensure the best return on investment for the complex. With the use of CCR catalyst regeneration, the processing unit does not require shut down to change out the catalyst to take advantage of market conditions.



FEATURES & BENEFITS

Make on-purpose propylene at low cash cost of production and participate in the growing propylene market, independent of steam crackers or FCC units.

Applications

The majority of propylene is produced as a byproduct of petroleum refineries (FCC/RCC) and olefin plant steam crackers. As a result, most propylene is a byproduct of gasoline and ethylene. However, when production capacity is not coupled with a demand for those byproducts, a supply/demand imbalance can occur. The Oleflex process provides petrochemical producers with a catalytic, on-purpose means of making propylene from propane.

The Oleflex process provides producers with a high-quality propylene, which can be used to create to high-quality polymers. Downstream polymerization process users have reported less polymerization catalyst consumption because of fewer impurities in the propylene product. Furthermore, the Oleflex process has the potential to be integrated with multiple downstream technologies for energy and material waste minimization.

Description

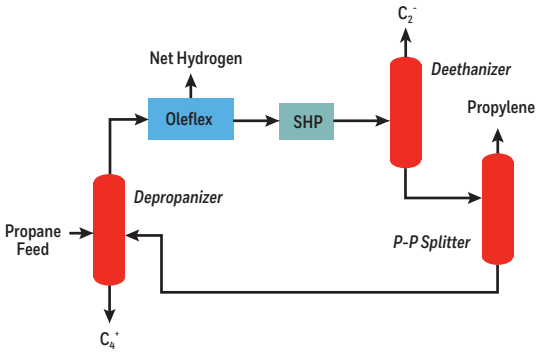
The UOP Oleflex process is separated into three different sections: the reactor section, the product recovery section, and the catalyst regeneration section.

The reactor section of the Oleflex process consists of four radial-flow reactors, charge and interstage heaters, and a reactor feed-effluent heat exchanger. In the product recovery section, the reactor effluent is cooled, compressed, dried, and sent to a cryogenic system to separate hydrogen from hydrocarbon.

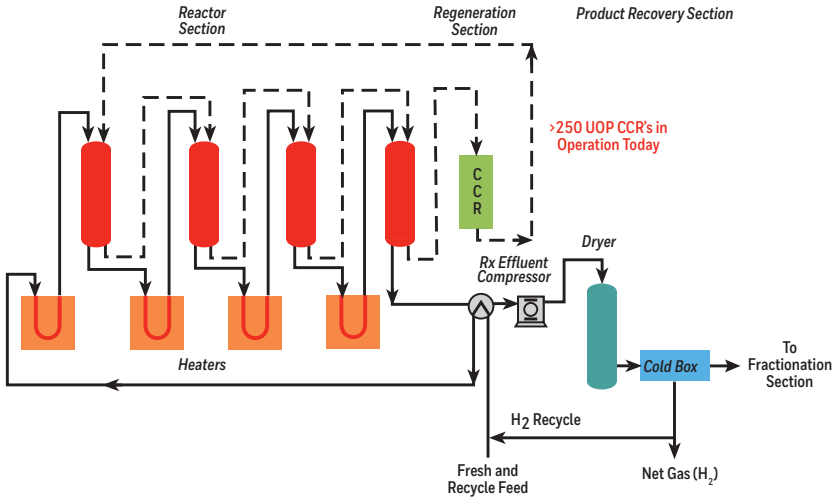
The net gas can be recovered for the valuable, high hydrogen byproduct, or used to fuel the process and reduce utility requirements. Separator liquid is sent to a selective hydrogenation unit to convert diolefins and acetylenes to additional propylene. Then the liquid goes to a deethanizer and propane-propylene (P-P) splitter to produce a chemical or polymer-grade propylene product. Unconverted propane is recycled to maximize olefin production.

The selective diolefin and acetylene hydrogenation step is accomplished with the Hüls SHP process licensed by UOP. The continuous catalyst regeneration section removes the small amount of coke deposited by the process on the catalyst and returns it to fresh activity.

C_3 Oleflex Complex



C_3 Oleflex Process



Feedstock

The feedstock to a C_3 Oleflex process unit is propane. Propane is recovered from propane-rich LPG streams from gas plants. Propane is also available as a byproduct from such refinery operations as hydrocracking, delayed coking, and fluidized catalytic cracking (FCC) and (RCC) resid catalytic cracking units. The C_3 Oleflex process is very efficient in converting propane to propylene, which minimizes feedstock costs.

Catalyst

The Oleflex process uses a platinum catalyst to promote the dehydrogenation reaction. The DeH-16 catalyst represents the sixth generation of catalyst. Not only does the DeH-16 catalyst maintain the high activity and selectivity of previous generation catalysts with low attrition rates, platinum investment is signifcantly reduced compared to earlier catalysts.

Commercial Experience

The Oleflex process was commercialized in 1990. Currently 15 propane units and three mixed propane/isobutane units produce more than 6,800,000 MTA of propylene. In addition, eight isobutane units have been commissioned. At the end of 2016, seventeen additional Oleflex units were in various stages of design and construction.

For more information
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UOP4524-2c March 2017

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