Oleflex™ Process for Propylene Production

**INTRODUCTION**

The UOP Oleflex process is a catalytic dehydrogenation technology for the production of light olefins from their corresponding paraffins. One specific application of this technology produces propylene from propane. Propylene is the world’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 5% per year for the near future. The Oleflex process provides:

- A dedicated source of propylene supply for downstream use.
- Increased control over long-term propylene costs.
- High-quality propylene production, which leads to high-quality polymers.
- Potential for process integration with downstream technology.
- Continuous on-stream production of propylene.

In addition, the Oleflex process utilizes UOP’s proprietary equipment and systems for optimal operations, including PSA Polybed™ units, modular CCR, UOP lock hopper control, MD™ distillation trays, High-Flux™ tubes, and process instrumentation controls (PIC).

Integration of these products within the Oleflex process results in significant capital and operating cost savings for the complex and provides an overall guarantee for the Oleflex process and products. With the use of CCR catalyst regeneration, the processing unit does not have to be shut down to change out the catalyst.

**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 other products, specifically 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 independent of the demand for gasoline and ethylene.

The Oleflex process provides producers with a high-quality propylene, which then leads to high-quality polymers. This process consumes less polymerization catalyst because of fewer impurities in the propylene product and has the potential to be integrated with existing downstream technology.

**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 sepa-
rate hydrogen from hydrocarbon. The net gas is recovered at 85 to 93 mol-% hydrogen purity. Separator liquid is sent to a selective hydrogenation unit to eliminate diolefins and acetylenes. 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 the reactor section.

The selective dioefin and acetylene hydrogenation step is accomplished with the Hüls SHP process licensed by UOP. The catalyst regeneration section burns coke off the catalyst and returns it to fresh activity.

**FEEDSTOCK**

The feedstock to a C₃ Oleflex process unit is propane. Propane is recovered from propane-rich LPG streams from gas plants. Propane is also available in smaller quantities as a byproduct from such refinery operations as hydrocracking, fluidized catalytic cracking (FCC) and (RCC)* resid catalytic cracking units.

**CATALYST**

The Oleflex process uses a platinum catalyst to promote the dehydrogenation reaction. The DeH-14 catalyst, introduced in 2001, represents the fifth generation of catalyst. Not only does the DeH-14 maintain the high activity and selectivity and low attrition rates required for the dehydrogenation process, it also has lower platinum investment than earlier catalysts.

**COMMERCIAL EXPERIENCE**

The Oleflex process was first commercialized in 1990. Currently five propane units and one mixed propane/isobutane unit produce more than 1,250,000 MTA of propylene. In addition there are five isobutane units that have been commissioned.

**FOR MORE INFORMATION**

Oleflex technological services are available on request. For more information, contact your local UOP representative or contact our Des Plaines sales office:

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