PETROCHEMICALS

Lummus/UOP Classic SM™ Process

High-reliability ethylbenzene production

Introduction

The Lummus/UOP Classic SM process is well known in the industry for its deep vacuum/adiabatic ethylbenzene dehydrogenation technology, efficient heat integration, and demonstrated high mechanical integrity. The unique dehydrogenation reactor system is designed to operate at a very cost effective, minimal operating pressure for achieving the highest SM selectivities at high conversions. Our ongoing program of catalyst and process development provides clients with technologies that have significant capital and operating cost advantages

Description

The feedstock, ethylbenzene, is catalytically dehydrogenated to styrene in the presence of steam in a fixed-bed, radial flow reactor system. The dehydrogenation reaction is favored by low pressures and is generally conducted under deep vacuum. Toluene, benzene, and some light compounds are formed as by-products. The overall reaction is endothermic with heat supplied by steam in the adiabatic reactors. Reactor effluent waste heat is recovered through heat exchange with combined feed and by generating steam which is utilized in the process. The offgas stream is compressed, processed through the off gas recovery section, and used as fuel in the steam superheater. The condensates from the condenser and off gas recovery section flow into the separator where hydrocarbon and water phases separate. The dehydrogenated mixture is fractionated to recover the styrene monomer product and recycle ethylbenzene, as well as benzene and toluene by-products. Inhibitors are added to prevent styrene polymerization in the process equipment.



Long-standing, robust process that consistently produces high purity styrene at the lowest operating cost.

FEATURES & BENEFITS

The Lummus/UOP Classic SM process features:

- Styrene monomer purity of 99.85 Wt% minimum
- High per pass EB conversion (up to 69%) for lower operating costs due to less EB recycle
- Overall EB selectivity to styrene of more than 97 mol-% for lower EB feed consumption
- Low equipment pressure drop, which permits the reactor operation to operate at high vacuum, for higher product quality and lower EB feed consumption
- Minimum pressure drop radial bed reactors for lower operating pressure, resulting in lower EB feed consumption and reduced by-product formation
- Energy savings from patented heat recovery that does not require compression equipment

UOP also offers the Lummus/UOP EBOne™ process, which features the UOP EBZ-800TL zeolitic catalyst. Combined with the Lummus/UOP Classic SM process, it provides an efficient and reliable process for the production of styrene monomer.

Feedstock and Products

Feedstock

Ethylbenzene	99.85 Wt%
Xylene	50 ppm Wt max.
Diethylbenzene	8 ppm Wt. max.

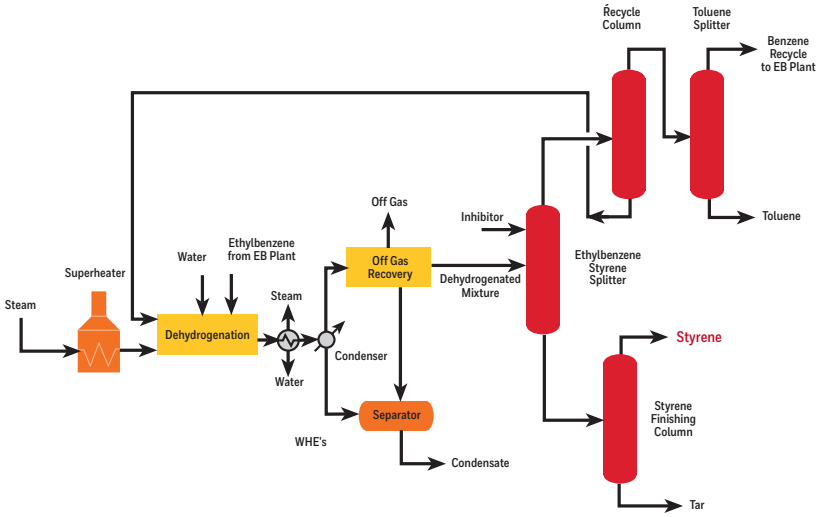
Styrene Product

Styrene	99.85 Wt% min.
Ethylbenzene	0.03 Wt% max.
Alpha-methylstyrene	0.03 Wt% max.

Commercial Experience

Since its introduction in 1970, the technology has been selected for over 55 major projects throughout the world. Capacities range from 66,000 MTA to 715,000 MTA with 39 commercial plants in operation and 1 in design and construction.

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For more information
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