Acrylate Esters Technology

LUMMUS TECHNOLOGY

Overview

Acrylate esters are produced from the esterification of Ester-grade Acrylic Acid with Alcohols.

Four Acrylate products are available using various Alcohol feedstock:

ALCOHOL FEED	ACRYLATE PRODUCT
METHANOL	METHYL ACRYLATE (MA)
ETHANOL	ETHYL ACRYLATE (EA)
n-BUTANOL	BUTYL ACRYLATE (BA)
2-ETHYL HEXANOL	2-ETHYL HEXYL ACRYLATE (2EHA)

The technology is reliable and commercially proven. The process incorporates many specialized design features and operational learnings to prevent polymer formation and enable long periods of sustained operation, a key challenge in handling of Acrylic esters.

The Synthomer plant at Sokolov, Czech Republic has been in operation since the 1980's. The plant has been expanded twice, most recently in 2002, and is currently operating with the suite of all four Acrylate products. Periods of more than one year of sustained operation are routinely achieved.

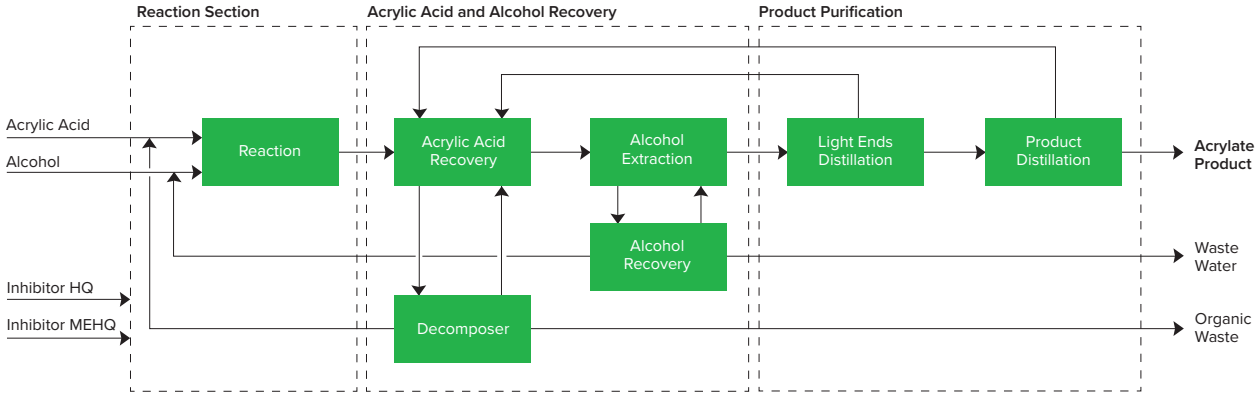
The Acrylate unit(s) can be paired with Lummus' Ester-grade Acrylic Acid (EAA) technology for process integration efficiencies in the utility and waste treatment systems. Additionally, operational and maintenance best practices for polymer inhibition may be shared to enhance the reliability of both units.

Advantages

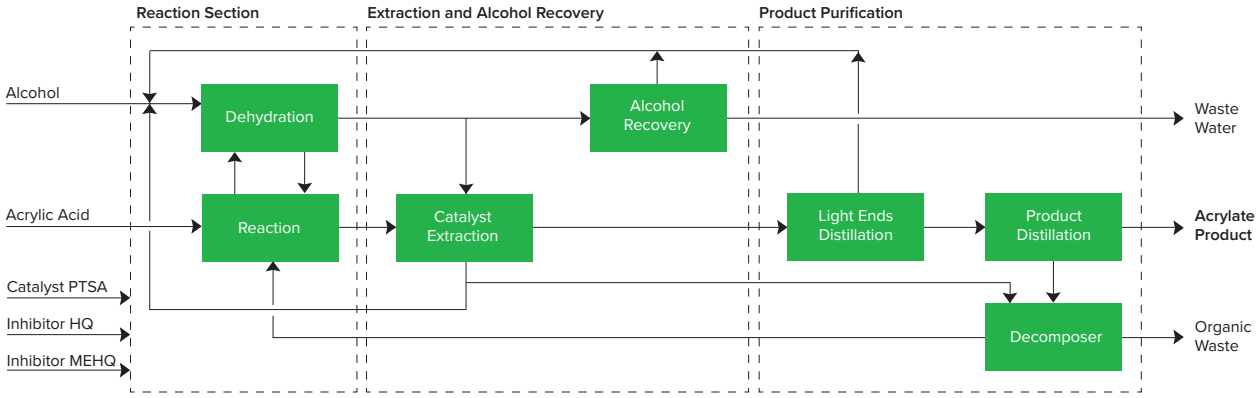
Process Features	Process Benefits
High Onstream Factor	Low Operating Costs
Simplified Downstream Purification Process	Non-Proprietary, Environmentally Friendly Catalyst
Decomposer System for Improved Yield	Applied Operating Experience
Integration with Lummus Acrylic Acid Technology	Optional Campaign Mode

Block Flow Diagram

Light Acrylates Process Flow Diagram (Methyl Acrylate, Ethyl Acrylate)



Heavy Acrylates Process Flow Diagram (Butyl Acrylate, 2-Ethyl Hexyl Acrylate)



Process Description

Reaction

Ester-grade Acrylic Acid and Alcohol feedstock undergo an esterification reaction to form Acrylate product. The Light Acrylate products utilize a fixed-bed heterogeneous catalyst, while the Heavy Acrylate products employ a liquid-phase homogeneous catalyst. Process conditions in each case are adjusted to maximize conversion to Acrylate product.

Recovery / Purification

In the Light Acrylates process, unreacted Acrylic Acid is first separated and recycled to the reactor section. Alcohol is extracted using process water, and the resulting crude Acrylate solution is purified to Acrylate product by distillation. Heavy ends are recycled to the Decomposer system where they are converted to additional Acrylate product.

In the Heavy Acrylates process, water formed in the reaction is continuously evaporated to drive the reaction to nearly complete Acrylic Acid conversion. The resulting solution undergoes a liquid extraction using process water to recover the homogeneous catalyst. Alcohol is recovered from the aqueous streams of the plant and recycled, while Acrylate final product is purified by distillation. Heavy ends are converted by the Decomposer system and recycled to the reactor section.

Process Chemistry

Example (Methyl Acrylate):

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