TECHNIP ENERGIES

MITSUBISHI CHEMICAL GROUP

MITSUBISHI CHEMICAL CORPORATION

Mitsubishi Chemical OXO Alcohol ‘M-Process’

(for the production of Normal Butanol and 2-Ethylhexanol)

The Mitsubishi Chemical OXO Alcohol ‘M-Process’ technology produces the highest product quality of Normal Butanol (NBA) and 2-Ethylhexanol (2EH) from Syngas and Propylene using a unique ligand catalyst. The resulting N/I isomer ratio is very high while reducing propane and heavy end products. The relative capacities of the NBA and 2EH production can be designed to satisfy client requirements.

OXO Reaction Section

In this section, normal-Butyraldehyde (NBD) is produced from Propylene and Syngas in a liquid phase reactor using a homogenous Rhodium/Ligand catalyst complex dissolved in NBD. A small amount of propane and a very small amount of iso-Butyraldehyde (IBD) are produced by side reactions. The gas and liquid purge streams containing these byproducts are ultimately used as fuel. Catalyst and ligand are recovered from a small hydroformylation purge stream.

The OXO section contains three steps: (1) OXO reaction; (2) aldehyde separation; and (3) catalyst recovery.

Normal Butanol (NBA) Section

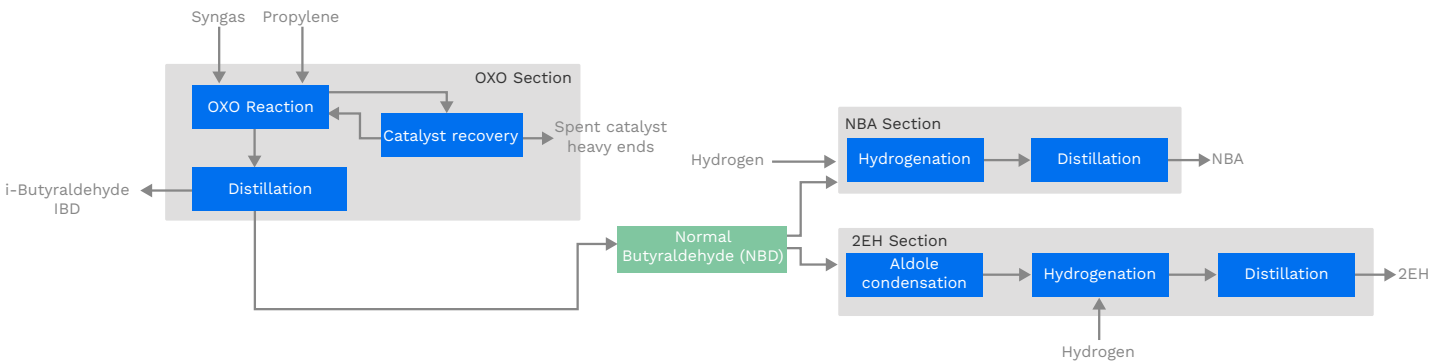
In the NBA section, the NBD intermediate is converted to Normal Butanol. This process is divided into two steps: (1) NBD hydrogenation and (2) NBA distillation.

2-Ethylhexanol (2EH) Section

In the 2EH section, the NBD intermediate is converted to 2-Ethylhexanol. This process occurs in three steps:

1. NBD aldole condensation and dehydration
2. Hydrogenation of 2-Ethylhexenal
3. 2EH distillation

OXO Alcohols process scheme



Mitsubishi Chemical OXO Alcohol Unit

Mitsubishi Chemical OXO Alcohol ‘M-Process’ technology highlights

OXO Reaction Section

High N/I Isomer Ratio

The Mitsubishi Chemical OXO ‘M-Process’ technology achieves a significantly higher N/I isomer ratio than any other competing C3 OXO process. This eliminates the need for purification of the less valuable iso-Butyraldehyde (IBD), resulting in both investment and operating cost savings.

High Catalyst Utilization and Reduced Catalyst Management Requirements

Unlike other processes, the Mitsubishi Chemical OXO ‘M-Process’ uses a precisely designed distillation column to recover the catalyst from the reactor effluent. The vast majority of the catalyst is recovered and returned to the reactor using a technology MCC co-developed with Technip Energies.

Simple Operation

The required catalyst concentration is low due to the very high activity of the hydroformylation catalyst, and therefore is fully dissolved in NBD. There is no need for an external solvent and the risk of plugging is eliminated.

Alcohol Section

Low Operating Cost

The process uses the vapor-phase hydrogenation method, which has excellent reaction selectivity and low UTT requirement. This makes it possible to reduce operating costs.

High Product Purity

The distillation section is designed for efficient removal of minor product impurities, producing an ultra-high purity alcohol. The final product exceeds the purity requirements for production of OXO Alcohol derivatives such as solvents and acrylates.

Licensors

The Mitsubishi Chemical OXO Alcohol ‘M-Process’ is available for licensing from Technip Energies and Mitsubishi Chemical Corporation.

TECHNIP ENERGIES

Badger Process Technology
Erik Moy
erik.moy@ten.com
+1 617 748 7262

www.ten.com

MITSUBISHI CHEMICAL GROUP

Mitsubishi Chemical Corporation
License Group, RD & IP Dept.
Strategy & Planning Division,
Petrochemical & Coal
+81 3 6748 7262
MCJP-MBX-MCC_HO_
TECHNOLOGYLICENSE1@mchcgr.com

www.m-chemical.co.jp/en