MITSUBISHI CHEMICAL GROUP | Mitsubishi Chemical Corporation

Mitsubishi Chemical 1-Hexene Technology

1-Hexene

The estimated world demand of 1-Hexene in 2014 was approximately 800,000 ton/year and the growth rate will be expected twice or three times of world GDP.
Currently most of 1-Hexene is used for Linear Low Density Polyethylene (LLDPE) as Comonomer to improve the properties and to increase value of LLDPE.
In the past, the major process to produce 1-Hexene was Full Range Process which applies the oligomerisation reaction of ethylene. But this process generates various alpha-olefins (Carbon number: C4 – C30+) due to the feature of the reaction. From the point of view of 1-Hexene, the disadvantage of Full Range Process is very low selectivity of 1-Hexene (20-30% at most).

History of Mitsubishi 1-Hexene Technology

Mitsubishi has succeeded to develop a superior catalyst system for trimerization reaction of ethylene and to establish a very innovative On-Purpose Process for 1-Hexene. Mitsubishi has conducted some engineering works for commercial scale plants (20,000 - 50,000ton/year) and has successfully licensed this process to others.

Feature of Mitsubishi 1-Hexene process

Mitsubishi On Purpose Process uses ethylene as feedstock and produces 1-Hexene selectively.
Features of this process are as follows;

(1) Extremely excellent catalyst system / Simple and stable process

Mitsubishi catalyst system realizes not only excellent selectivity of 1-Hexene but also higher activity. So the process has milder reaction condition compared to conventional Full Range Processes.

Additionally, as the selectivity of polyethylene of Mitsubishi catalyst system is extremely low, Mitsubishi process is very simple and the operability is smooth and easy.

The following is the comparison table for the operation condition of Mitsubishi On Purpose Process and Full Range Process.

	Mitsubishi On Purpose Process	Full Range Process
1-Hexene Selectivity	Approximately 95%	20 -30%
Reactor Temperature	Less than 150 Degree C	180-220 Degree C
Reactor Pressure	Less than 10 MPaG	20-30 MPaG

(2) High quality product

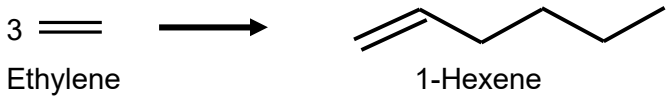
Mitsubishi has confirmed that 1-Hexene produced by the demonstration plant of Mitsubishi On-Purpose Process can be used for the commercial plants of Polyethylene without any problems. There are no differences in the performance of polyethylene with on-purpose Hexene process and the performance of polyethylene with Full Range Hexene process.

(3) Environmental Friendly Process

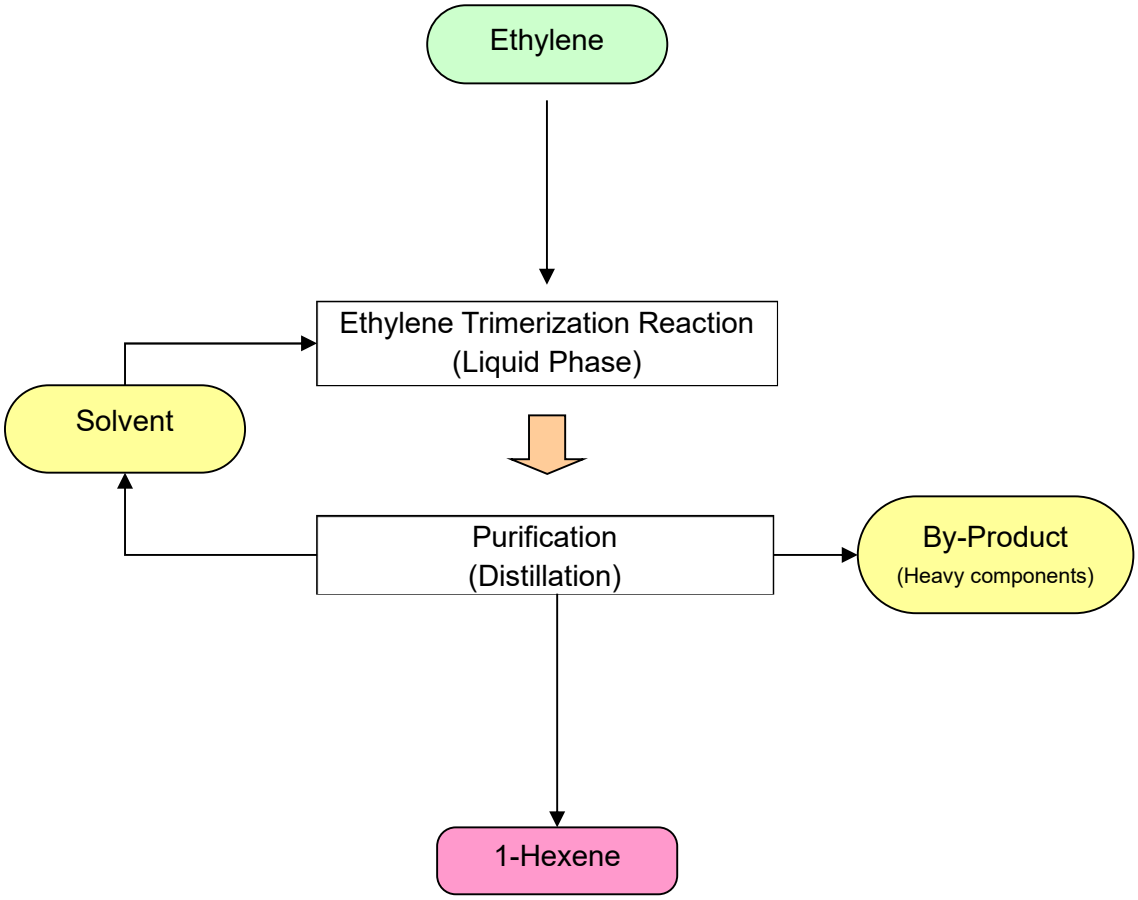
Mitsubishi On-Purpose Process never generates any waste water during the normal operation.

Chemistry

Trimerization reaction of ethylene



Simplified block flow



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