



# Licensed Chemical Technologies and Services

## *Trans4m S*

Process technology for the skeletal isomerization of C4 or C5 olefins using a highly selective, long-life catalyst to achieve near equilibrium conversion to isobutylene and isoamylenes

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LyondellBasell *Trans4m* Plant, Channelview, Texas

LyondellBasell, applying *Trans4m S* process technology, is the largest producer in the world of isobutylene. Available for license, *Trans4m S* is a fixed-bed reactor, catalytic process technology, utilizing highly selective tailored zeolite-based catalysts for the near equilibrium conversion of normal butenes to isobutene, or normal pentenes to isoamylenes.

The proprietary catalyst used in the *Trans4m S* process, Z-870, operates at reduced temperatures. It also enables very high conversion rates and a very simple process configuration to achieve leading investment and operating costs.

### Simple integration

*Trans4m S* processes are commonly integrated within Isooctene, methyl tertiary butyl ether (MTBE) / ethyl tertiary butyl ether (ETBE), high purity isobutylene and butene-1 units, or tertiary amyl methyl ether (TAME) units for significant increases in production.

### Key characteristics of *Trans4m S* process technology

#### Safety and Environment

- ▄ LyondellBasell's process technologies have a safety record among the best in the industry
- ▄ Very low energy consumption
- ▄ Non-hazardous products and materials used and produced

#### Catalyst and process technology highlights

- ▄ Highly selective zeolite-based catalyst system
- ▄ Exceptionally high process yields
- ▄ Near equilibrium conversion to iso-butenes or isoamylenes
- ▄ Long catalyst cycle time
- ▄ In-situ efficient regeneration for coke removal
- ▄ Non-fouling process

#### World-scale and proven

- ▄ Single-line, world-scale capacities greater than 600 kt/a can be provided
- ▄ Successfully licensed around the globe
- ▄ LyondellBasell has operated *Trans4m* technology at its Channelview, Texas, USA, site since 1995

#### Economics

- ▄ Low investment and operating costs possible due to moderate operating conditions and simple plant configuration
- ▄ Low incremental costs for increased MTBE production

### Trans4m S process description

The proprietary zeolite-based catalyst for C4 or C5 skeletal isomerization provides near equilibrium conversion of normal butenes to isobutylene, or normal pentenes to isoamylenes. The catalyst is highly selective, and operates during long cycle times before in-situ regeneration.

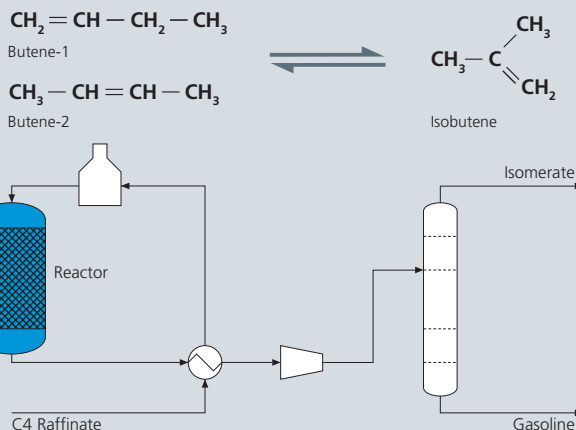
A wide variety of hydrocarbon feeds containing either n-butenes such as C4 raffinate, or n-pentenes such as C5 raffinate can be used without the need for additional processing or catalyst aids. Near equilibrium conversion to isobutylene or isoamylenes with very high yields of the contained normal olefins is achieved. The reactor effluent is then cooled and/or compressed, and then sent to a heavy ends column, where C4- or C5+ is separated by simple fractionation.

Following a long catalyst cycle, the feed is switched to a fresh catalyst bed and the spent catalyst is regenerated by oxidizing the coke with an air/nitrogen mixture, achieving high unit utilization.

C4 Trans4m S – simplified process flow diagram

Figure 1

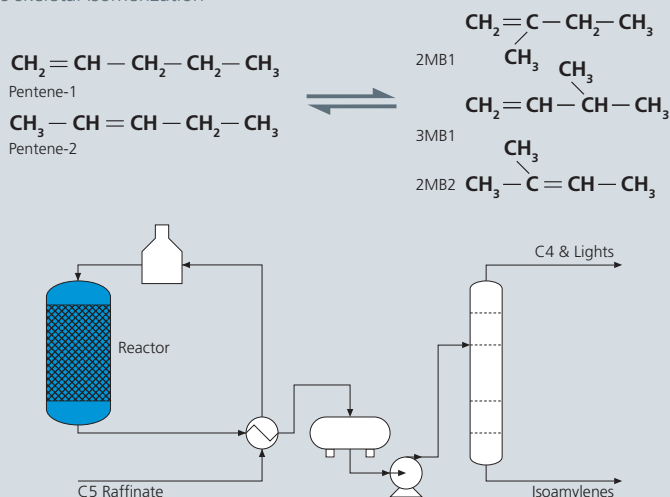
n-Butenes skeletal isomerization



C5 Trans4m S – simplified process flow diagram

Figure 2

n-Pentenes skeletal isomerization

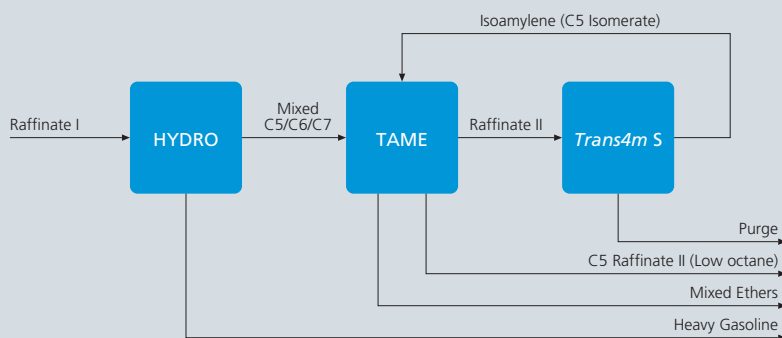


### Benefits of modular integration

The butene isomerate product from the C4 Trans4m S unit is particularly suited for integration with a MTBE/ETBE unit, or an isobutylene and butene-1 unit, resulting in increased production. Likewise, the pentene isomerate from the C5 Trans4m process is highly suited for feed to a tertiary amyl methyl ether (TAME) unit, achieving very high octane yields and reduced olefins content.

Example of C5 Trans4m S integrated with a TAME unit

Figure 3



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