

Overview The CDTECH EB catalytic distillation technology is a process for the production of high purity ethylbenzene. This modern process features high product yields, with low capital investment. The CDTECH EB process, licensed by Lummus Technology, is one of a family of process technologies developed by Catalytic Distillation Technologies (CDTECH) for license to the petroleum refining and petrochemical industries. CDTECH is a partnership between Lummus Technology, a CB&I company, and Chemical Research & Licensing, a CRI company.

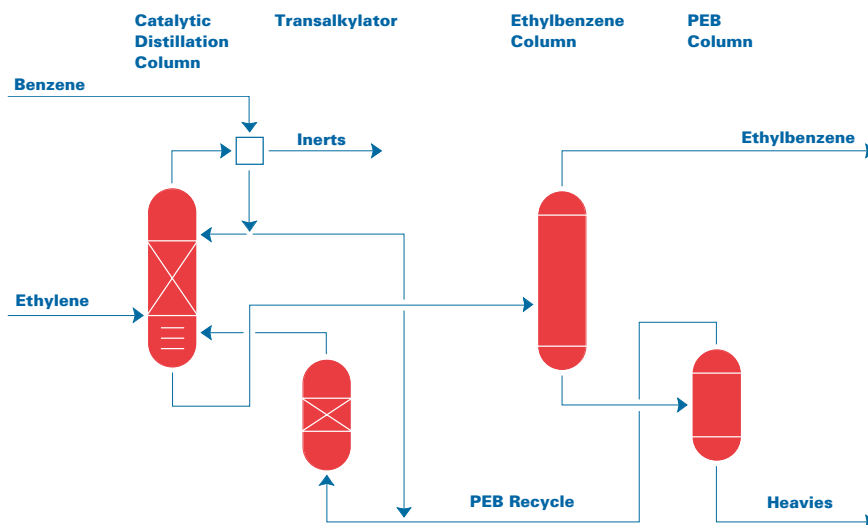
CDTECH EB Synthesis-General Ethylbenzene (EB) is formed by the catalytic alkylation of benzene with ethylene. The patented CDTECH EB process uses a proprietary zeolite catalyst in its patented catalytic distillation structures. The catalyst is non-corrosive and environmentally sound. Product yield up to 99.7% and EB purity of up to 99.9% is achievable. Xylene impurity formation is virtually eliminated, avoiding processing difficulties in the styrene unit. The exceptional quality of the ethylbenzene product easily surpasses requirements of styrene producers.

The unique catalytic distillation column combines reaction and fractionation in a single unit operation. Alkylation reaction takes place isothermally, and at low temperature. Reaction products are continually removed from the reaction zones by distillation. These factors limit the formation of by-product impurities, enhance product purity and yields, and result in reactor run length of up to five years. Low operating temperatures result in lower equipment design and operating pressures, which help to decrease capital investment, improve safety of operations, and minimize fugitive emissions. All heat input, including the heat of reaction, can be recovered as useful steam.

The CDTECH EB technology can process polymer grade ethylene feedstock, FCC offgas, or other dilute ethylene streams with purity as low as 10 mol%.

Three world-scale plants based on CDTECH EB technology are currently in operation, with another unit in design.

CDTECH EB Process Flow Diagram



Advantages**CDTECH EB process offers:**

Meets evolving environmental regulations and standards; minimizes fugitive emissions

High product yield

High product purity with virtual elimination of xylene contaminants and associated downstream processing difficulties

Simple, low pressure, and safe operation

Elimination of corrosion and acid waste disposal problems

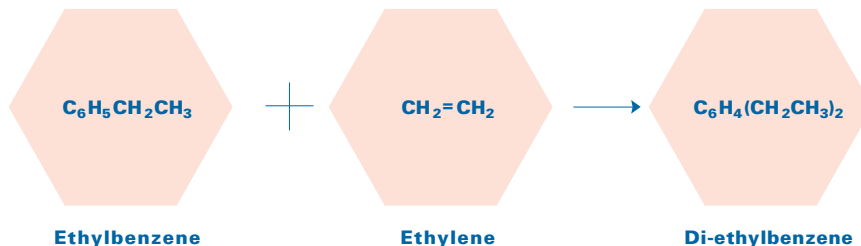
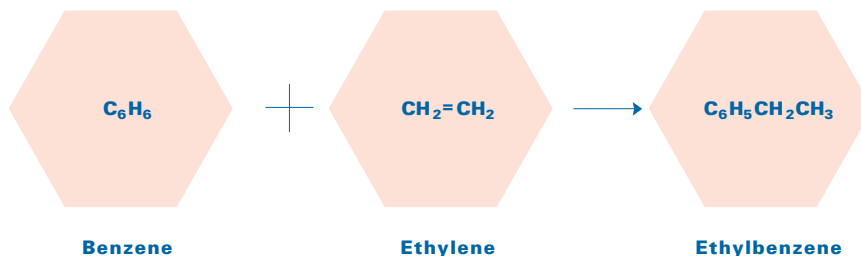
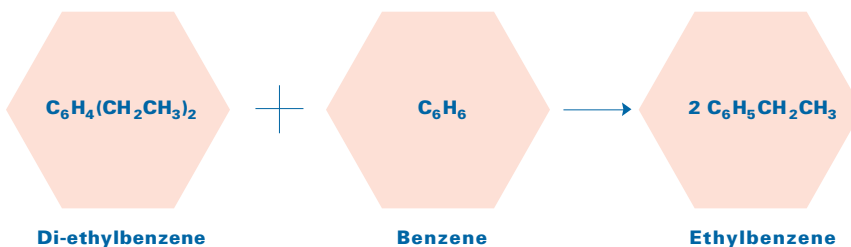
Standard carbon steel construction

Low capital and maintenance costs

Adaptable to processing dilute ethylene feedstocks

Long catalyst life with sustained high conversion; no frequent interruptions for catalyst regeneration

Applicable to conversion of existing EB plants

Process Chemistry**Alkylation****Transalkylation****Typical Overall Material Balance**

Feeds	LB/LB Ethylbenzene Product
Ethylene (100% basis)	0.265
Benzene (100% basis)	0.738
Products	
Ethylbenzene	1.000
Heavy Residue	0.003
Inerts	Varies with purity of ethylene feed

ETHYLBENZENE Product Quality

Purity	>99.9 wt. %
Specific Gravity 15/4°C	0.868–0.873
Color	10 APHA max.
Neutrality test	Neutral
Xylenes	<10 wtppm

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