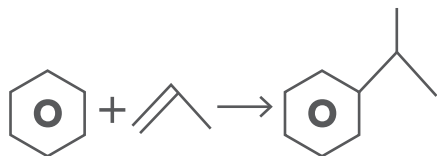




Higher yields at lower costs.

Increase gasoline volume and octane while reducing benzene.

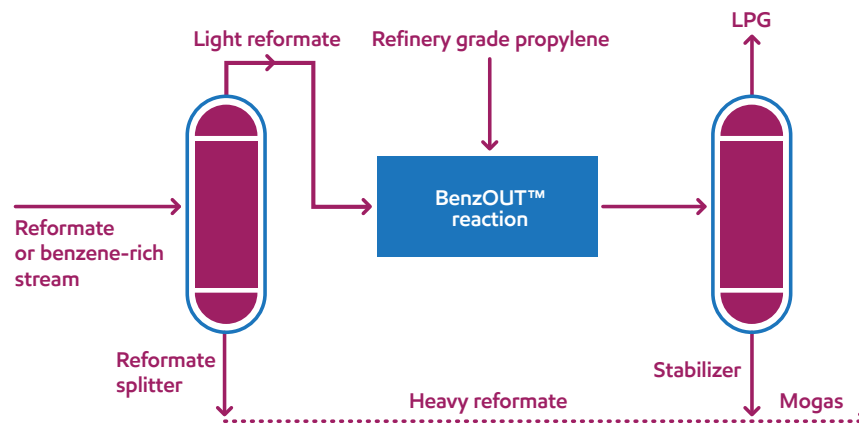
The BenzOUT™ process is a commercially proven technology for benzene reduction in gasoline. BenzOUT converts benzene, typically in a light reformate stream, to higher alkylaromatic blending components by reacting a benzene rich stream with light olefins, such as a refinery grade propylene stream.



No hydrogen consumption!

BenzOUT technology avoids octane loss with no hydrogen consumption associated with benzene saturation alternatives by alkylating propylene to the aromatic rich stream. BenzOUT can be a grassroots unit or retrofitted into an existing facility, such as a polygas unit. The technology was developed

by ExxonMobil and is available for licensing through Badger Licensing LLC to provide a unique process advantage to help refiners meet benzene regulations, while at the same time achieving an attractive economic return on their investment.



Key benefits



Lower operating cost

- Low temperature and pressure liquid phase process
- No hydrogen consumption
- Simple, fixed bed reactor



Volume swell

- Deep conversion of reformate stream benzene
- Gasoline volume swell



High octane

- Octane increase in the full reformate

BenzOUT™ technology process configuration

- Fixed bed catalyst technology. The process uses a fixed bed liquid-phase reactor resulting in low utility requirements.
- Catalyst. The process utilizes an ExxonMobil proprietary zeolite catalyst.
- Stabilization. Propane fed to the unit with propylene is removed from the BenzOUT product in a product stabilizer. This can produce a propane product of HD-5 quality. The product from the BenzOUT technology is a light reformate with a reduced RVP.

BenzOUT technology advantages and economical benefits

- Conversion of 95%+ of the benzene in a reformate stream : highly selective and stable catalyst enabling the process to run at a very high benzene conversion to meet EPA Mobile Source Air Toxics (MSAT) regulations

- Low temperature liquid phase process
- Octane increase : 2-3 numbers of (research octane number + motor octane number)/2 gain in a full reformate, depending on the feed composition
- No hydrogen consumption: refineries could feed all the C8 components (low blending octane values) to the reformer unit to achieve increased hydrogen production and octane gain
- Gasoline volume swell: upgrading of light olefins and benzene into high octane alkylaromatic blendstock would also result in a volume swell of the gasoline pool

BenzOUT services include:

- Initial consultations
- Development of licensing proposal
- Process Design Package, including basic design specification and operating guide
- Engineering support during FEED and EPC stages
- Technology transfer, training, catalyst loading and start-up support

About us

ExxonMobil helps refiners and petrochemical manufacturers increase capacity, lower costs, improve margins, reduce emissions and operate safe, reliable and efficient facilities. Along with a commitment to helping to implement best practices and to achieve better results, we provide cutting-edge proprietary catalysts and license advantaged process technologies for refining, gas and chemical needs.



The technology was developed by ExxonMobil and is available for licensing through Badger Licensing LLC* to provide a unique process advantage to help refiners meet benzene regulations, while at the same time achieving an attractive economic return on their investment.

*Badger Licensing LLC is a wholly owned subsidiary of Technip Energies

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