



Higher yields at lower costs.

Increase gasoline volume and octane while reducing benzene.

Energy lives here™

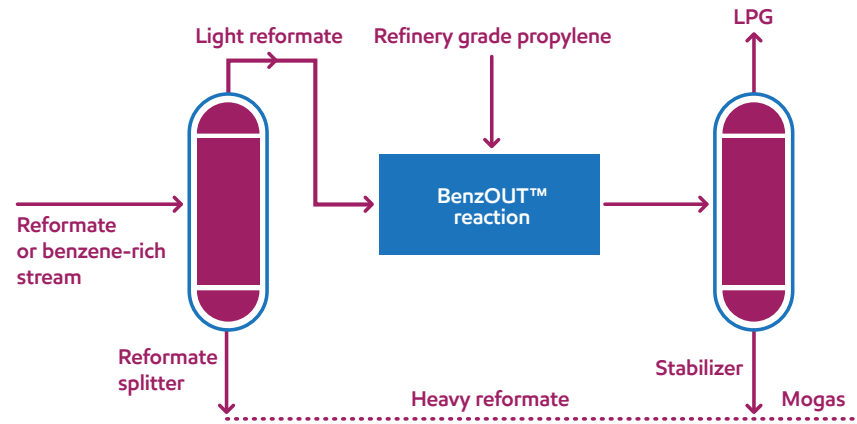
The BenzOUT™ process is a commercially proven technology for benzene reduction in gasoline. BenzOUT converts benzene, typically in a light reformate stream, to higher alkylaromatic blending components by reacting a benzene rich stream with light olefins, such as a refinery grade propylene stream.

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 TechnipFMC Badger Process Technology 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.



No consumption!



Key benefits

- Lower operating cost**
 - Low temperature pressure liquid phase process
 - No hydrogen consumption
 - Simple, fixed bed reactor
- Volume swell**
 - Deep conversion of reformatte stream benzene
 - Gasoline volume swell
- High octane**
 - Octane increase in the full reformatte

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
- Basic engineering 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.

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