Badger Cumene technology

Badger Cumene technology has gained worldwide acceptance as the standard for production of cumene. The Badger technology is a high yield, highly energy efficient, and low environmental impact process. It is easy to operate and maintain, and offers low capital and operating cost.

ExxonMobil and Technip Energies have a 25-year history of cooperation in the development of catalysts and processes for the production of cumene from polymer grade, chemical grade, and refinery grade propylene. Since its commercialization in 1996, the Badger Cumene technology has been licensed 37 times, both for new plants and for the expansion and conversion of plants based on earlier technologies to Badger Cumene technology. The exceptional properties of ExxonMobil's cumene catalysts allow operation with a minimal excess of benzene in the alkylation and transalkylation reactor feeds, reducing capital investment and energy consumption in the reaction and distillation sections of the cumene plant. Decades of commercial operation have demonstrated production of high-quality cumene product with long, uninterrupted catalyst cycle lengths.

Alkylation

An alkylation reactor system converts benzene and propylene to cumene in the liquid phase. A small fraction of the cumene is further alkylated to polyisopropylbenzenes (PIPB), which will be recovered in distillation and converted to cumene in the transalkylation reactor.

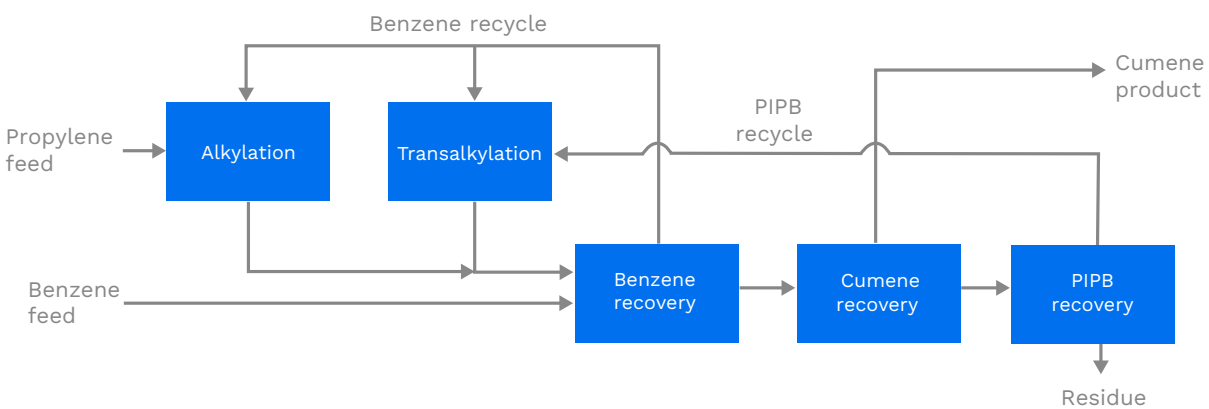
Transalkylation

A single bed transalkylation reactor converts the small amount of PIPB formed in the alkylator to additional cumene by reaction with benzene in the liquid phase.

Purification

A simple energy efficient distillation train is used to return excess unreacted benzene to the reactors, recover cumene product, and recycle PIPB to transalkylation.

Cumene process scheme



Cumene plant at night

Cumene technology highlights

LOW OPERATING COST

- Ultra-high (nearly stoichiometric) yields minimize raw material consumptions
- Low B/P and Bz/PIPB ratios minimize utility and power consumptions
- High energy efficiency and seamless integration with downstream phenol and bisphenol A units

LOW CAPITAL INVESTMENT

- Low B/P and Bz/PIPB ratios results in smaller distillation equipment
- Small reactors and catalyst volumes
- Low temperature, pressure, and non-corrosive conditions allows carbon steel construction

COMMERCIAL EXPERIENCE

- As of early 2021, plants using the Badger Cumene technology produce over half of the world's cumene capacity having a total installed capacity in excess of 10 million metric tons per year
- Single train capacities as large as 750 KTA have been licensed and demonstrated
- Badger technology can produce high quality cumene from any commercial grade of propylene
- Badger technology has successfully supplied cumene to all major downstream phenol processes

Our catalyst provider: ExxonMobil

ExxonMobil Catalysts and Licensing LLC zeolite catalyst research and development capabilities are unsurpassed within the industry. Supported by basic research activities at its R&D facilities and pilot plant facilities used to screen new catalysts, ExxonMobil is a recognized leader in the development and commercialization of new zeolite catalytic materials. ExxonMobil's commercial catalyst production plants maintain the highest quality control standards. The exceptional characteristics of the cumene catalysts benefit the process as follows:

- The proprietary zeolite catalyst does not age due to oligomerization and coking, resulting in long, uninterrupted commercial catalyst cycle lengths
- ExxonMobil's zeolite catalyst does not require hot benzene washes or special procedures to restore catalyst activity
- The alkylation catalyst is highly selective to monoalkylation, which has allowed operation at design benzene-to-propylene molar feed ratios as low as 1.8-to-1
- The reaction system produces extremely low levels of impurities boiling in the range of cumene, resulting in cumene product purities in excess of 99.97 wt%

Badger

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