

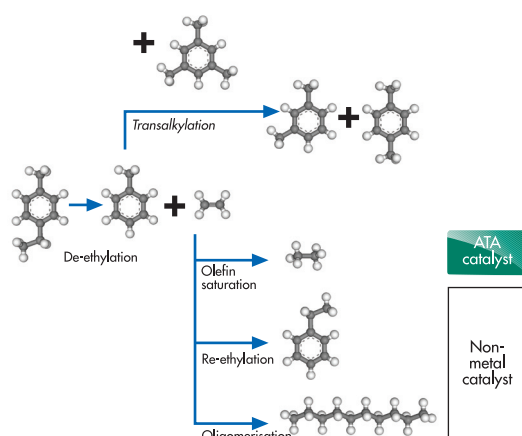
## Transalkylation Catalyst

The ATA series catalyst is our high performance transalkylation catalyst that utilizes a proprietary zeolite as the active material. Developed in the SK Energy and Zeolyst laboratories, it is especially designed for high conversion and feed composition flexibility.

ATA-11 catalyst was commercialized in 1999 and its performance was enhanced in 2002 leading to an improved ATA-12 catalyst. As per 2010, the ATA catalyst has 14 commercial references. Applying sophisticated catalyst manufacturing technology, the ATA catalyst combines a high activity for conversion of toluene and C<sub>9</sub>+ aromatics into benzene and low ethylbenzene-content mixed xylenes with superior catalyst stability and yields.

### Applications

ATA-11 and ATA-12 catalysts are used in aromatics complexes in the toluene disproportionation unit or transalkylation unit when conversion of toluene and C<sub>9</sub>+ aromatics to mixed xylenes and benzene is required. Processing C<sub>9</sub>+ aromatics in a transalkylation unit shifts the chemical equilibrium in the unit away from benzene production and towards xylene production. The transalkylation process provides a means of producing more mixed xylenes from low-value toluene and heavy aromatics. The incorporation of a transalkylation unit into an aromatics complex can more than double the yield of paraxylene from naphtha feedstock.



### Feeds

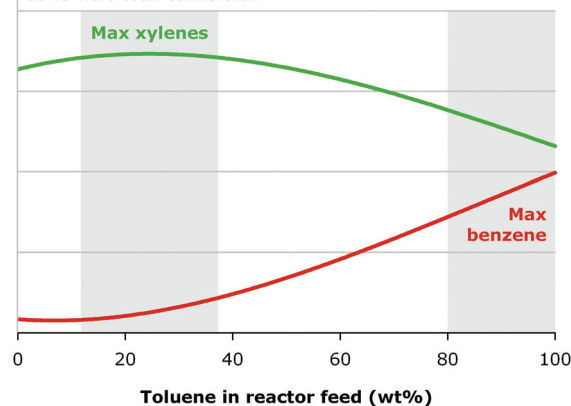
One of the major benefits of the ATA-12 catalyst is its feed flexibility. The ATA-12 catalyst can process feed compositions ranging from benzene-rich feedstocks or 100% toluene to 100% C<sub>9</sub>+ aromatics. This feed flexibility allows the user to optimize feed sources and effectively capture market price swings.

### ATA-12 Advantages

#### (1) Feed flexibility

100% C<sub>9</sub>/C<sub>10</sub> fresh feed can be treated, which helps in the upgrading of lower value feedstocks into higher value products. By adjusting the toluene content in the reactor feed, the plant operator can maximize xylene yields as required. This flexibility allows our users to optimize the operational economics of the transalkylation unit.

**Benzene and C<sub>8</sub> aromatics yield on reactor feed at 45 wt% total conversion**

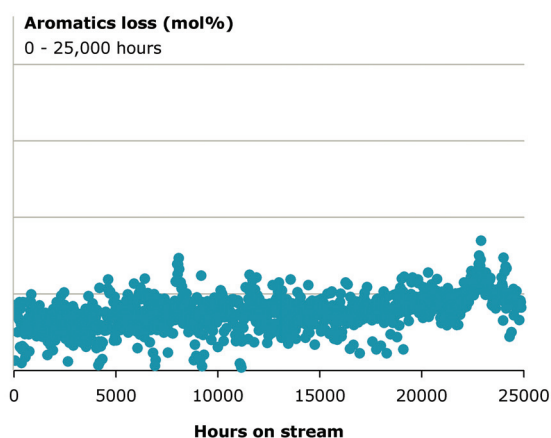


Impure benzene/toluene can be treated through ATA-12, whilst still meeting the on-specification benzene product purity.

### (2) High Efficiency Operation

High aromatics retention is achieved with the use of ATA-12 catalyst. The aromatics loss is very low, which results in very high feed efficiency.

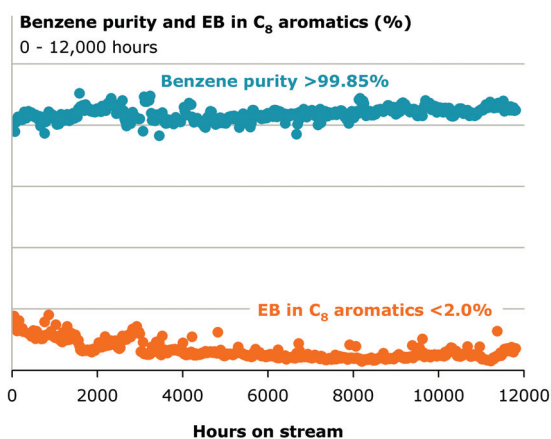
Very little hydrogen is used for aromatics saturation, as it is utilized essentially for olefin saturation and non-aromatics hydrocracking, hence hydrogen consumption is low. This helps to reduce the operating cost.



### (3) Superb Product Quality

Benzene purity is more than 99.85%, and no additional processing through an extraction unit is required.

Ethylbenzene in C<sub>8</sub> aromatics is low, which helps to improve the paraxylene recovery in the adsorption/separation unit, or increase the feed load.



### (4) High Activity

ATA-12 catalyst can be operated at high weight hourly space velocity (WHSV) of up to 3.5hr<sup>-1</sup>, with no significant changes on yields. Deactivation rate remains low. This allows the plant to reduce the amount of catalyst required. For a grassroots unit, this reduces investment cost.

### (5) Low H<sub>2</sub>/HC

ATA-12 catalyst can be operated at very low H<sub>2</sub>/HC ratio with no significant changes on deactivation rate. This also reduces utility cost or investment cost for grassroots unit.

### (6) Excellent Catalyst Stability

Based on our numerous commercial experiences, ATA-12 catalyst has proven to be extremely stable. A typical cycle-length is more than 4 years, and can be as long as 8 years.

The ATA-12 catalyst advantages can improve plant operations by increasing product yields at lower operating cost, throughout the entire cycle-length.

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