Xylene Isomerization Catalyst - Ethylbenzene Reforming Type

Opars™ series catalyst is a new generation xylene isomerization-ethylbenzene reforming type catalyst with a greatly improved paraxylen (PX) yield over other commercial catalysts. The catalyst combines high activity for conversion of ethyl benzene into xylenes with very low by-product make and superior stability. Approach to equilibrium for paraxylen is close to the thermodynamic limit.

Opars™ catalyst was developed in the labs of IFP/Axens and is manufactured and marketed by Zeolyst International. Grassroots licences are available in conjunction with Axens.

This catalyst has been commercialized since 2001. To date, it has been applied at 14 commercial units, with multiple successful regeneration experiences.

Applications

Opars™ catalysts are used in aromatics complexes when conversion of ethylbenzene to xylenes is required in combination with isomerization of xylenes into the equilibrium composition. Appropriate process conditions can achieve very high ethylbenzene conversion levels, while the approach to equilibrium for paraxylen is almost at the thermodynamic limit of 100%.

Owing to its very high activity and selectivity, Opars™ catalyst can be used for catalyst replacement when debockenecking and/or minimum benzene production is desirable.

Ethylbenzene Isomerization to Xylenes

Xylene Isomerization

Feeds

Typical feeds processed over Opars™ catalyst are Cs aromatic streams depleted of paraxylen, and sometimes also of ortho-xylene, usually effluent from a crystallizer or from an adsorption-based paraxylen recovery unit.

When Opars™ catalyst is applied, high concentrations of ethylbenzene in the fresh feed to the complex can be used because the high conversion limits build-up of ethylbenzene in the recycle. This gives the user the ability to blend in large amounts of Cs aromatics extracted from pygas streams that are high in ethylbenzene.

Opars™ Advantages

(1) High Selectivity
Improved Process Economics

Performance of Opars™
Xylene loop PX Yield, %

Adsorption-based

PX Separation Recovery Rate, %

The PX yield achieved with an Opars™ based xylene loop is significantly higher than previous generation catalysts, and improvements of more than 10% in yields can be achieved.
(2) Enhanced Isomerization Activity

As compared to previous generation catalysts, Oparis™ catalyst can achieve very high PX approach-to-equilibrium whilst maintaining low losses. This allows the plant to widen the operating window and optimize based on the various operation scenarios.

(3) Better Operational Stability

After the initial stabilization period, the catalyst activity is very stable. The 1st cycle length is typically more than 3 years.

The activity of the catalyst can be easily restored by a carbon burn-off, and this can be done either in-situ or ex-situ. Based on numerous regeneration experiences, close to fresh catalyst activity can be achieved after each regeneration.

OparisPlus™ - An Improved Catalyst

OparisPlus™ catalyst was developed with innovative improvements, resulting in an excellent catalyst performance.

Its catalyst activity is enhanced whilst overall C8 ring loss is reduced by 20% as compared to Oparis™. Moreover, there is a 30% drop in gas make, which significantly improves the operational economics.

Performance of Oparis™ vs. OparisPlus™

20% reduction in C8 ring loss, %

Oparis™

OparisPlus™

PX approach to equilibrium, %

Performance of Oparis™ vs. OparisPlus™ in C7-C9 make

30% reduction in gas make, %

Oparis™

OparisPlus™

PX approach to equilibrium, %