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Process for Extending Mo-zeolite Catalyst Lifetime During Methane Dehydroaromatization

A regeneration strategy that restores Mo-MFI activity and extends catalyst life for methane-to-aromatics processing.

Researchers at Purdue University have developed a method for regenerating molybdenum-zeolite catalysts for the methane dehydroaromatization (DHA) reaction. Methane DHA converts methane to aromatics and hydrogen. The primary issue with methane DHA with the Mo-MFI catalyst is the fast catalyst deactivation (after ~10 hours) and reduced performance upon regeneration. This is attributed to MFI framework dealumination during the regeneration cycle, reducing the number of ion-exchangeable Mo sites. The Purdue invention restores the initial activity of a partially deactivated Mo-MFI catalyst. By adding fresh catalyst consisting of MFI containing some amount of framework Al atoms and then subjecting the spent-fresh catalyst mixture to a regeneration cycle, all Mo species are regenerated to the active phase (Mo-carbides).

Technology Validation: When the researchers mixed spent Mo-MFI with fresh H-MFI and subjected it to the methane DHA reaction and regeneration cycle, benzene formation rate was restored to the initial value with the starting Mo-MFI catalyst.

Advantages:

- Extends useful catalyst lifetime

Applications:

- Petrochemicals production

TRL: 4

Intellectual Property:

Technology ID
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Category
Chemicals & Advanced Materials/Specialty & Performance Chemicals
Energy & Power Systems/Hydrogen & Fuel Cell Systems
Chemicals & Advanced Materials/Materials Processing & Manufacturing Technologies

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