

Dehydrogenation Catalyst for Toluene/MCH LOHC Process

APPLICATION

The toluene/methylcyclohexane (MCH) liquid hydrogen carrier process is an innovative and efficient method for storing and transporting hydrogen. This process utilizes the reversible chemical transformation between toluene and methylcyclohexane to safely and effectively store hydrogen in liquid form, making it ideal for long-distance transport and various end-use applications.

Under high-pressure hydrogen and in the presence of Delion's hydrogenation catalyst, toluene reacts with hydrogen to form methylcyclohexane (MCH). MCH serves as a hydrogen-rich liquid carrier, storing hydrogen in a chemically bound form. It is then transported to the end-use site, where it is converted back into toluene and hydrogen is released at elevated temperatures in the presence of Delion's dehydrogenation catalyst.

DESCRIPTION

DELION's dehydrogenation catalyst is specifically designed for the fixed-bed process and utilizes a proprietary alumina support. The catalyst demonstrates high activity, enabling the efficient dehydrogenation of methylcyclohexane (MCH) into toluene at moderate temperatures and pressures. This ensures maximum conversion rates of at least 98% per pass while minimizing side reactions. The catalyst shows enhanced hydrothermal stability, providing a long service life of at least 3 years. It offers a cycle duration of several months without regeneration, maintaining a selectivity of over 99% toward toluene. The catalyst combines high activity, exceptional selectivity, and outstanding stability under operating conditions. Additionally, it exhibits high resistance to deactivation, excellent mechanical properties, and ensures cost-effectiveness through its long service life.

PHYSICAL & CHEMICAL PROPERTIES

Parameter	Unit	Specification
Form	-	sphere
Color	-	light grey
Mean diameter	mm	2.8
Bulk Density	g/ml	0.50±0.05
Crushing Strength	N/cm	>40
Al ₂ O ₃	%	>99.5
Active component		Pt

PROCESS CONDITIONS & PERFORMANCE

Element	Unit	Specification
Pressure	MPa	0.1-0.3
Temperature	°C	250-350
WHSV	kg _{feed} /kg _{catalyst} ×h	0.5-2.0
Catalyst life	years	>3