



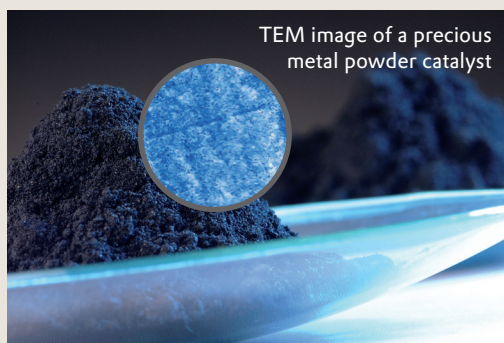
Catalysts by Evonik

Handling Procedures for Precious Metal Catalysts (PMC)

General Information and Storage

Evonik precious metal catalysts (PMC) are supported catalysts with platinum group metals such as palladium, platinum, rhodium, ruthenium or mixtures of these metals as the active component. Precious metal loading is typically in the range of 1 – 20 wt%. The support is usually a highly porous material, e.g. activated carbon, carbon black, calcium carbonat, alumina, silica or others with a high surface area on which the metal is fixed. The following five criteria determine the performance of a precious metal powder catalyst:

- **Activity:** high activity shortens reaction time and increases throughput
- **Selectivity:** high selectivity reduces formation of by-products
- **Filterability:** good filterability leads to fast catalyst separation from reaction mixture
- **Recyclability:** multiple use of a catalyst diminishes process costs
- **Precious metal recovery:** good precious metal recovery also diminishes costs



General Safety Advice

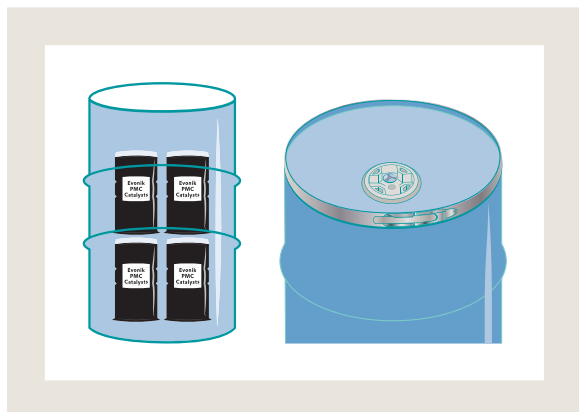
PMC can be used in either dry or water-wet form. Although the wet catalysts contain 40 – 70 wt% water, both types are free-flowing powders. Whenever possible we recommend to use wet type catalyst as this is safer to handle than dry catalyst. Always consult the latest version of the Material Safety Data Sheet (MSDS). Here at a glance are the most important safety rules for handling precious metal powder catalysts:

- Use caution to avoid any dust formation (PM losses) when using dry catalyst.
- When handling PMC avoid any ignition source.
- Avoid skin contact with PMC and do not swallow.
- Use the appropriate personal protective equipment when handling PMC, e.g. safety goggles, rubber gloves, lab coat. If dust formation occurs, e.g. while handling a dry catalyst, a dust protection mask must be worn if the occupational exposure limit (OEL) is exceeded.
- Prevent water-wet PMC from drying out.
- Inert your reactor before charging it with PMC.
- Charge the catalyst first into the reactor, followed by the solvent.
- For dry PMC the reactor and the solvent should be cooled during charging.
- For highly loaded PMC and highly flammable solvents, carry out small-scale charging trials.
- Handle used PMC from a hydrogenation reaction with care; it contains hydrogen that may self-ignite in air.



Drum Handling

The PMC catalysts are supplied in steel drums. Special packaging, for example in small polyethylene (PE) bags, is available on request. These PE bags are closed with an easy to open and reuse clip. UN/1A2 approved drums are equipped with a pressure relief valve to prevent an increase of pressure during transportation and storage.

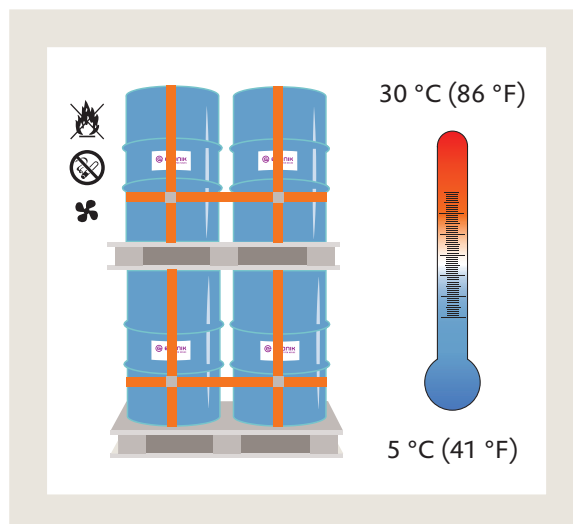


During transportation the drums shall be fixed in an upright position. Empty drums should be retained for storage of the spent catalysts and their transport to the refiner.



PMC Storage

Fresh PMC should be stored in their original sealed drums to keep out air and other gases until the catalysts are used. The drums should be kept in a cool, dry place away from direct sunlight and not exposed to the elements. The catalysts shall be stored at temperatures between 5 and 30 °C (41 – 86 °F).



This is to prevent unwanted modifications of the catalyst, e. g. drying out of a wet catalyst, or moistening of a dry, hygroscopic catalyst. Flammable organic vapours or liquids should not be present in the storage area, due to the possible fire hazards described. As a matter of safety, do not remove the labels from PMC drums until the contents are removed and the drums are cleaned.

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