



Catalysts by Evonik

Handling Procedures for Precious Metal Catalysts (PMC)

Precious Metals from spent PMC

For the overall economics of chemical processes that work with precious metal powder catalysts, the recovery of the precious metal is of vital importance. Evonik manages the whole precious metal loop, which starts with the purchase of precious metal and management of the precious metal account, and ends with the coordination of all activities around recovering the precious metals (see Fig. 1). Our global network of state-of-the-art audited and ISO-certified metal refineries carries out the recovery and refining for our customers.

The fresh precious metal powder catalyst is used in the catalytic process and recycled (i.e. re-used) where this is applicable. In the chemical process precious metal losses may occur which has various reasons:

- Losses while handling the powder catalysts
- Precious metal leaching in the process
- Losses of fine catalyst particles in the filtration step

Treatment of spent PMC

For the treatment of the spent catalysts after the final usage, it is filtered off and collected. Contact of the spent catalyst with flammable organic vapours or liquids must be avoided whilst being stored in a cool, dry place. Besides precious metal the spent catalyst also contains other chemicals originating from the chemical process. The spent catalysts are shipped to a metal refinery, where the precious metals are extracted. This process leads to a complete destruction of the catalyst.

Weight accounting

Once the precious metal is recovered the amount of metal is booked to the customer's precious metal weight account. From this account precious metal is taken for the production of fresh catalyst. The customer owns the precious metal weight account with the possibility to close it at any time.

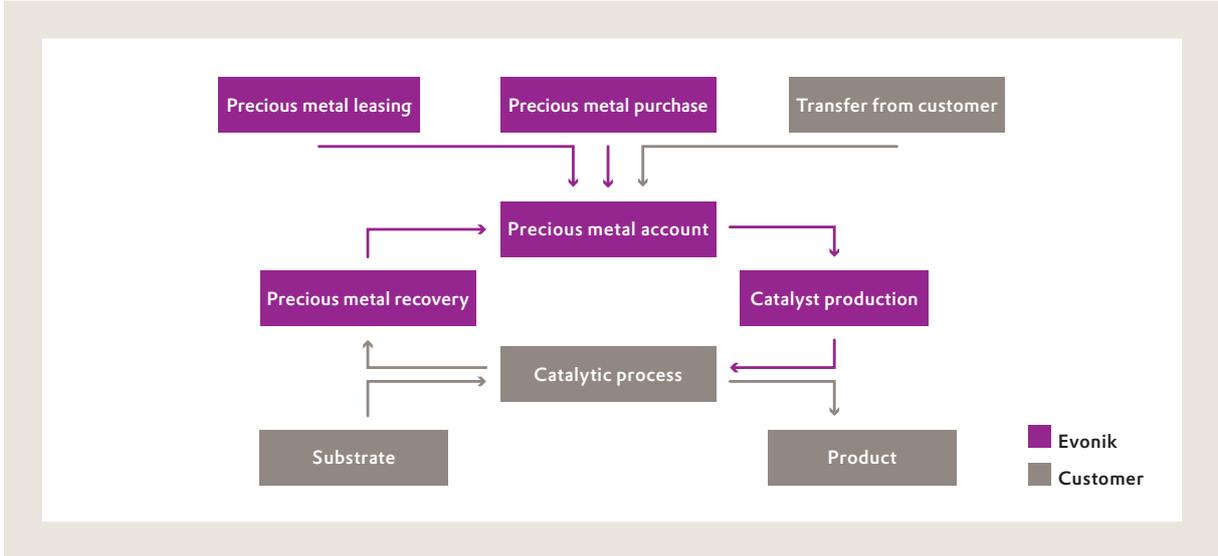


Figure 1: Precious metal loop

Option 1: precious metal sampling after burning

For the transportation of spent catalysts we recommend to use polyethylene bags with 25 kg content which can be burnt together with the catalyst. Pack them in drums for shipping (see Fig. 2). These PE bags should be that stable not to break or leak material in any way during transportation and handling. You can use the drums in which the fresh catalyst was sent. If you equip the drums with an inner bag, take care that no losses of valuable material can occur. Material that contains low amounts of precious metal (e.g. hand gloves, filter cloths, filter candles) should be packed separately and the drum labelled accordingly.

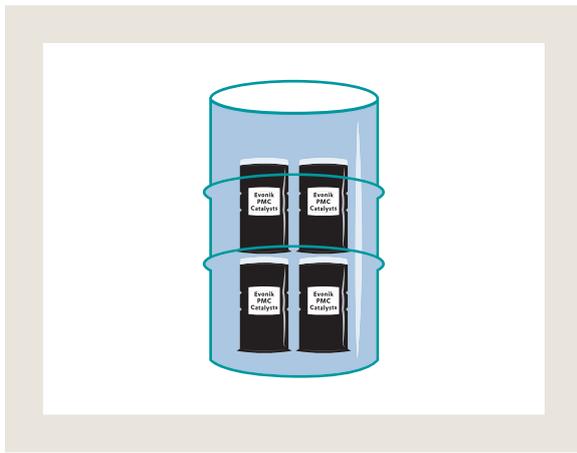


Figure 2: PE-bags in a drum

Option 2: precious metal sampling before burning

The spent catalyst should be shipped in a large metal drum, without any solids apart from the spent catalyst (e.g. hand gloves, filter cloths, filter candles). The spent catalyst must not be packed in small bags (no inner bags).

In addition, the spent catalyst has to:

- be thoroughly washed, steamed and delivered moistened with water but solid for handling and shall not contain any excess liquid.
- not be self combustible.
- be packed and marked according to international transport laws. The spent catalyst must be packed without any additional liquid in 120 or 200 l steel UN-approved drums with metallic lid or in approved pails. Authorization to use other packaging must be agreed to in advance of a shipment.
- be shipped together with a copy of the completed questionnaire, "Information on spent precious metals catalyst", and a Material Safety Data Sheet (MSDS). Furthermore the completed questionnaire (see Fig. 4) has to be sent to Evonik 10 days in advance of dispatch. The dispatch itself needs written approval by Evonik before consigning. Without approval Evonik is allowed to refuse the consignment.
- be separated from all materials that are not spent carbon catalyst, but would be combustible, for example, cloths and filters. These materials have to be cleaned and disposed at the customers' site or if included, because of precious metal content, they must be packed and labelled separately. Additional cost or any change in conditions involved with the processing of these special materials will be passed on to the customer.
- be prepaid, packed and insured (DDU, duty unpaid, incl. declaration T1).

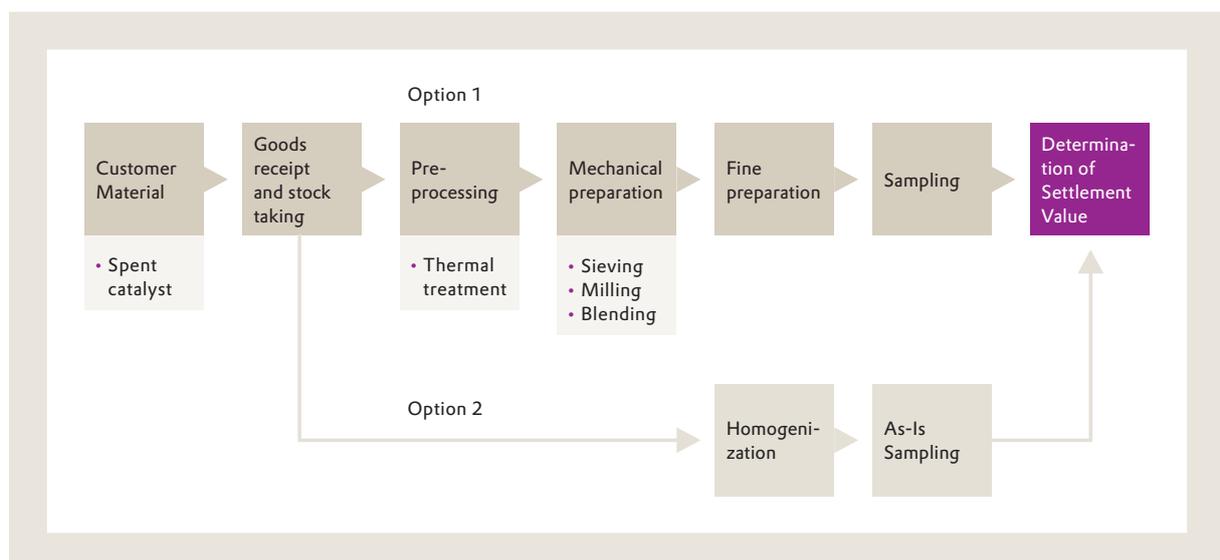


Figure 3

Transport and Legislation

Legislation requires the sender of spent catalysts to obey national and international transport, waste and environmental regulations and traffic laws for residual materials and waste. It must be checked, for example, if the residual chemicals in the spent catalyst need to be classified as dangerous goods. If necessary, special regulations and permits for packaging and transport may be required. When shipped as dangerous goods, the catalyst has to be packed in approved drums that are not corrosive for the contents and are suitable for transport and storage. The shelf life of the drums must be good for at least half a year after arrival. Any packaging must be no more than 4.5 years old. Furthermore, all requirements concerning the transport and handling

of dangerous goods have to be observed, particularly those for packaging, labelling and documentation.

For example, markings have to include:

- UN-number,
- Consignor,
- Consignee,
- Gross and net weight,
- Transport
- Dangerous goods classification

Furthermore, the corresponding transport emergency cards and instructions in writing have to accompany the shipment.



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Questionnaire for spent Materials containing Precious Metals

Waste producer:		Importer:		
		Evonik Resource Efficiency GmbH BL Catalysts Rodenbacher Chaussee 4 D-43427 Henne-Wollfang, Germany		
		Delivery address (Consignee):		
		Heraeus Deutschland GmbH & Co. KG Zur Verf. Evonik Resource Efficiency GmbH, BL Catalyst Recycling Hochregallager Wilhelm-Rohm-Strasse D-43449 Henne		
If the waste producer and the party contracting with Heraeus are different entities, please state the name and address of both entities				
The information provided below should only refer to materials of the same type. If materials of different types are delivered, please fill out separate Questionnaires for each type of material.				
1. Material description				
Customer reference no.:	Please state a reference no. (e.g. your order no., batch no., etc.)			
Quantity in kg:	Gross weight:	Net weight:		
	incl. pallets: Yes <input type="checkbox"/> No <input type="checkbox"/>			
	Number of pallets:			
2. Packaging	Container type:	Volume:	Quantity:	
	Drums (metal)	<input type="checkbox"/> ltrs	Packing units are: sealed: No <input type="checkbox"/> Yes <input type="checkbox"/>	
	Big bags	<input type="checkbox"/> ltrs		
	Hubboxes (plastic)	<input type="checkbox"/> ltrs		
	IBC	<input type="checkbox"/> ltrs		
Other: please specify	<input type="checkbox"/> ltrs			
3. Properties of material (please tick at least one box):				
<input type="checkbox"/> Solids, dry	<input type="checkbox"/> Solids, moist	<input type="checkbox"/> Solid sludge / fiber cake	<input type="checkbox"/> Sludge with excess liquid	<input type="checkbox"/> Free flowing powder
<input type="checkbox"/> Dust	<input type="checkbox"/> Free flowing granules	<input type="checkbox"/> Solution	<input type="checkbox"/> Suspension	<input type="checkbox"/> tarry (high viscosity)
<input type="checkbox"/> Ingots	<input type="checkbox"/> Slags	<input type="checkbox"/> Filters/ cartridges	Other (please specify):	

Figure 4: Questionnaire

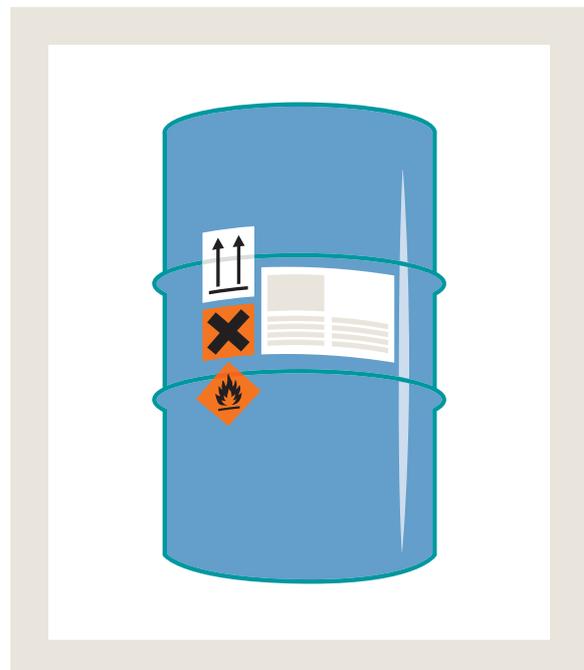


Figure 5: Labelling of the drum

Europe

Evonik Resource Efficiency GmbH
Business Line Catalysts
Rodenbacher Chaussee 4
63457 Hanau-Wolfgang
Germany
Phone +49 6181 59-13399
Fax +49 6181 59-2699

North America

Evonik Corporation
Business Line Catalysts
299 Jefferson Road
Parsippany, NJ-07054
USA
Phone +1 800 422-8773
Fax +1 973 929-8504

South America

Evonik Brazil Ltda.
Business Line Catalysts
Rua Arquiteto Olavo
Redig de Campos,
105 Torre A – 13º e 14º andar
04711-904 - São Paulo - SP
Brazil
Phone +55 11 3146-4100

Japan

Evonik Japan Co., Ltd.
Business Line Catalysts
Shinjuku Monolith 12th Floor,
2-3-1, Nishi-Shinjuku,
Shinjuku-ku
163-0938 Tokyo
Japan
Phone +81 3 5323-7363
Fax +81 3 5323-8789

China

Evonik Specialty
Chemicals (Shanghai) Co., Ltd.
Business Line Catalysts
55 Chungdong Road,
Xinzhuang Industry Park
201108 Shanghai
China
Phone +86 21 6119-1461
Fax +86 21 6119-1142

India

Evonik Catalysts India Pvt Ltd.
F - 1/2, MIDC Phase 1
Dombivli (East) – 421213
District Thane
India
Phone +91 25 124 71716
Fax +91 25 124 70269

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EVONIK RESOURCE EFFICIENCY GMBH

Business Line Catalysts

catalysts@evonik.com

www.evonik.com/catalysts

www.evonik.com

