



Catalysts BY EVONIK

Handling Procedures for Activated Metal Catalysts (AMC)

AMC Reactor Charging

Lab reactors

Not water sensitive

If the reaction is not water sensitive, then the catalyst can be transferred immediately to the reactor from the container it was weighed in. The amount of water in the reaction can be reduced if the catalyst is allowed to settle and the excess water is removed before reactor charging. The settling time for the catalyst can be shortened, and the removal of excess water can be simplified by the use of a centrifuge. Excess water removal should be performed slowly via siphon behind a safety shield or in a fume hood. If the excess water is removed by a vacuum pump, then an in-line trap must be used. If necessary, use water to rinse out any catalyst stuck to the reactor wall during charging. Since catalyst deactivation can result from air oxidation, the catalyst must not be exposed to air during reactor charging.

Water sensitive

If the reaction is water sensitive, then the water in the catalyst slurry can be displaced with a suitable solvent. First allow the catalyst slurry to settle, decant the excess water (see above), add the desired solvent. Mix the solvent with the catalyst, allow the catalyst to settle and decant the supernatant liquid. This solvent/decantation should be repeated to reach the desired water content. If the desired solvent is not water miscible, then first replace the water with a water miscible solvent (e.g. ethanol) and then replace this with the desired final solvent. Additional amounts of the desired solvent can be used to wash any catalyst stuck to the reactor wall during charging.

! Care must be taken when choosing the desired solvent because as well as being pyrophoric, AMC can also react exothermically with certain solvents (e.g. certain carbonyl and nitro compounds) at room temperature.

Commercial scale reactors

The following steps can be followed to charge a commercial scale reactor.

1. Stir the catalyst in the drum to form an easy to pour slurry. (Figure 1)
2. Carefully and quickly, rinse the drum into the transfer vessel, ideally with a diaphragm pump. (Figure 2)
3. Pump the catalyst slurry into the reactor. It is important that the catalyst is transported through slanted tubes. Horizontal tubes and other places the catalyst can collect should be avoided. (Figure 3)

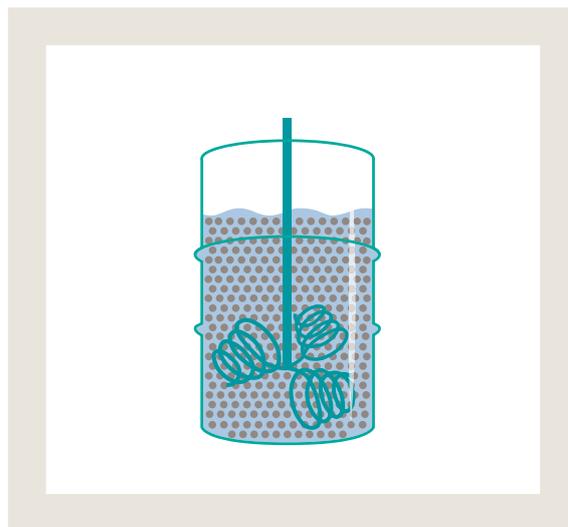


Figure 1

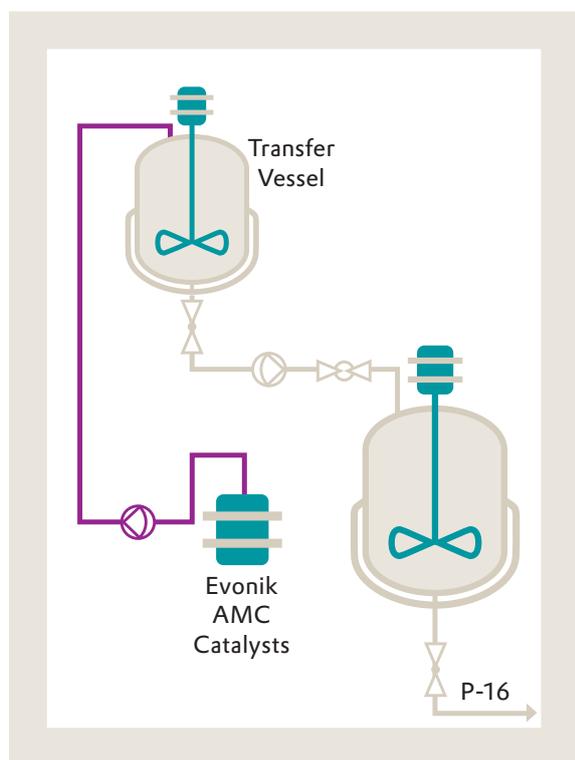


Figure 2

If the reaction is water sensitive, then remove the excess water from the catalyst in the transfer vessel while under a nitrogen blanket. Replace the water with the reactions solvent. Stirring the catalyst slurry between the solvent addition step and the removing of water also enhances the removal of water. If the desired solvent is not water miscible, then first replace the water with a water

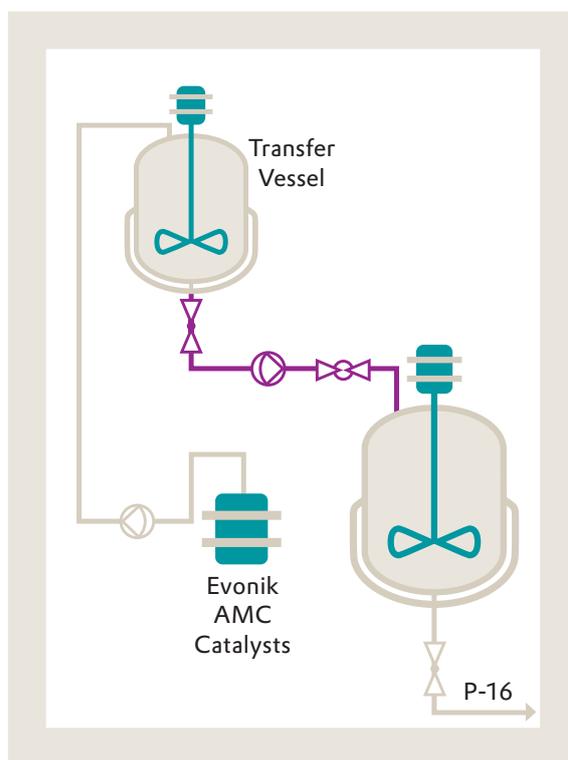


Figure 3

miscible solvent (e.g. ethanol) and replace this with the final solvent. A more complete removal of water can be accomplished by repeating this procedure.

All waste solutions from this step should be filtered under an inert atmosphere to remove catalyst fines before solvent disposal. A magnetic separator is highly recommended for this filtration.

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