# Question 10: When replacing a noble metal catalyst with a base metal catalyst in a two-stage hydrocracking unit configuration, how can you be certain that under a low sulfur, low hydrogen sulfide environment, the second stage catalyst will remain sulfided?

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A base metal sulfide catalyst will always have less, or hydrogenation compared to a noble metal catalyst. However, in certain situations where deep hydrogenation is not needed, the base metal sulfide catalyst can provide adequate hydrogenation activity. Operation with a base metal catalyst will be between 10 to 20o F higher than a noble metal catalyst, and this will shift the yield towards more thermally cracked lighter products.

Due to the presence of platinum on the noble metal catalyst significant fill cost savings are achieved by loading base metal catalysts.

It would not be recommended to operate a base metal catalyst in a completely sweet service without the presence of H2S. The catalyst risks reduction of the metal sulfides, which will impact the activity and can permanently damage the catalyst.

Effective ways to get around the sulfur stripping of the base metal catalyst in an H2S free environment include spiking by DMDS injection, slipping of some sour gas from the 1st stage over to the 2nd stage, turning off the amine wash, and/or raising the hydrocarbon organic sulfur slip. H2S in the second stage recycle gas is in the range of 15 to 40 ppm to keep the catalyst sulfided.

For a standalone second stage reactor, another issue is corrosion. Since a typical sweet second stage does not have wash water injection, it is important to be careful of metallurgy, especially on the second stage air effluent coolers.

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