



Increased Sulfur Capacity with KATALCO™ 32-6

Background

The sulfur absorbent in a North American 18 MMSCFD hydrogen plant was being changed out every three to four weeks. Originally designed for feed with sulfur levels of 32.5 ppmv and change outs every six months, the plant was experiencing feed with 200 ppmv at start of run. Due to the frequent desulfurized bed change-outs the lead / lag system was operated as if in single bed mode due to these high sulfur levels.

	Original design	Current operation
Plant Capacity (MMSCFD)	18	18
Inlet Sulfur (ppmv)	32.5	200
Vessel Configuration	Lead/Lag	Single

Application of KATALCO 32-6 was able to extend this site's desulfurizer performance from 3-4 weeks online to four months, shown below in Figure 1.

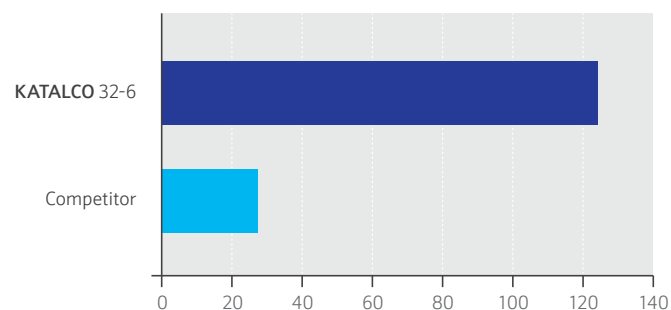


Figure 1: Comparison of product life, competitor versus KATALCO 32-6.

Desulfurizer Performance

Johnson Matthey's KATALCO™ 32-6 offers 20% greater sulfur capacity compared to standard sulfur absorbents. In addition, KATALCO 32-6 contains promoters to maintain a sharp sulfur absorption profile. This elevated capacity and sharp mass transfer zone make KATALCO 32-6 ideal for duties with high sulfur loadings requiring frequent bed change outs.

Plant trials were completed using sample baskets to achieve a direct comparison between a standard sulfur absorbent and KATALCO 32-6. The results are shown in Figure 2. The sample baskets clearly demonstrate the improved sulfur pickup with the use of KATALCO 32-6.

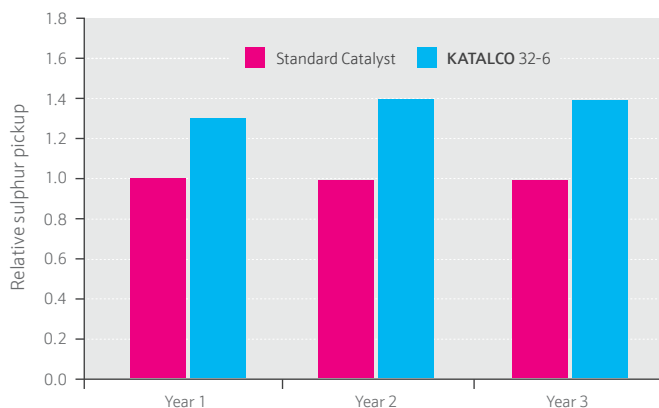


Figure 2: Sample basket results comparing KATALCO 32-6 to standard catalyst.

In addition, two full charges of KATALCO 32-6 were installed. One month after installation of the first bed, sulfur survey results showed a level of 42.7 ppmv exiting the HDS reduced to 0.075 ppmv exiting the lead bed of KATALCO 32-6. The second bed was installed two months after the first in the lag position.

The second charge was moved to the lead position two months later and discharged after four months online a significant improvement from typically lasting 3-4 weeks. The discharged sample analysis is shown in the graph below.

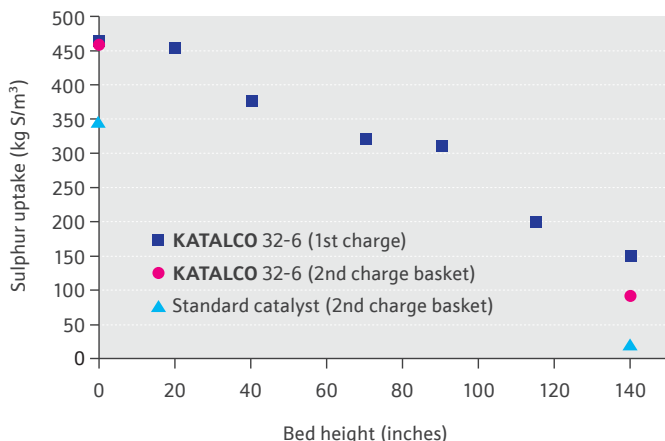


Figure 3: Discharge sample results of sulfur uptake compared to bed position.

KATALCO 32-6 achieved an average sulfur pickup that is 30% higher than the standard sulfur absorbent. This is greater than the 20% expected for lead / lag purification systems because the beds were operated in single bed mode.

The increased sulfur capacity of **KATALCO 32-6** resulted in less catalyst change outs per year. Fewer change outs result in reduced catalyst volume and a product savings of more than \$92,000 per year. In addition, a savings of nearly \$90,000 per year in change out costs were achieved. This resulted in an overall savings of approximately \$182,000 per year. The use of **KATALCO 32-6** is valued added to your hydrogen manufacturing unit.

KATALCO 32-Series

All **KATALCO 32-series** absorbents are granulated (rather than extruded) to give superior pore structure. Enabling more of the available ZnO can be accessed and converted to ZnS. This ensures predictable, long lives with sulfur removal to very low levels offering improved protection to downstream catalysts.

- Optimized pore structure: The unique granulation manufacturing route of **KATALCO 32-series** results in a high porosity, spherical zinc oxide.
- Diverse product portfolio: Johnson Matthey offers a wide selection of ZnO products allowing for a tailored solution.
 - **KATALCO 32-4**: The open pore structure allows for a sharp sulfur absorption profile allowing for full utilization of the absorbent prior to breakthrough
 - **KATALCO 32-5**: Engineered to maintain an open pore structure as it saturates with sulfur, which allows maximum sulfur pick-up.
 - **KATALCO 32-6**: Our premium product has the absorption profile of **KATALCO 32-4** and a pick-up capacity comparable to **KATALCO 32-5**.
- High performance: The optimized pore structure allows for near theoretical pickup.

Contact your local Johnson Matthey office for more information on how we can benefit your site.