Product Information

UltraCAT® Preactivation

Make Your Startup Easier, Quicker, and Safer

Description

Hydrotreating catalysts with metals in the oxide state are inactive for removing sulfur or nitrogen from hydrocarbon feedstocks. These metal oxides must be converted to metal sulfides to maximize activity. Typically, this can be achieved by:

- In-situ sulfiding, which requires sulfiding agents (e.g. DMDS), heat and H_2 during the activation
- Ex-situ presulfurization (actiCAT®), which requires heat and H_2 during the activation
- Ex-situ preactivation (**UltraCAT**), which is fully activated and ready-to-use

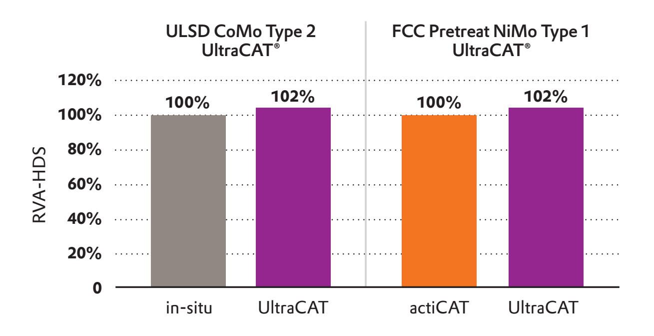
Performance

Extensive testing of **UltraCAT** technology in Evonik's pilot plants has confirmed equivalent activity to proven industry standards (see figure 1), namely:

- Ex-situ presulfurization (actiCAT)
- In-situ sulfiding with DMDS introduction

The degree of preactivation after our **UltraCAT** treatment on hydrotreating catalysts has been assessed by X-Ray Photoelectron Spectroscopy (XPS) to reflect the optimal oxidation state of Molybdenum as MoS2 (Mo+4) and as metal oxy-sulfides (Mo+6). **UltraCAT** has been compared to competitive preactivation technologies while giving the same degree of preactivation.

Figure 1: UltraCAT® preactivation performance vs "in-situ" and actiCAT®



Advantages

	In-situ	actiCAT	UltraCAT
Faster and easier start-ups	No	Yes	Yes
Exotherm during start-up	Yes	Minimal	No
H_2 make-up needed during start-up	Yes	Minimal	No
H_2S release during start-up	Yes	Minimal	Negligible
Odor release from sulfiding agents	Potential	No	No
Handling of sulfiding agents	Yes	No	No
Metals reduction during activation	Potential	No	No
Temperature required for activation	650°F (345°C)	600°F (315°C)	None

Technology

Evonik is now able to supply preactivated catalysts. This technology converts metal oxides to metal sulfides and requires no further activation during the start-up. The **UltraCAT** technology has been specially formulated to overcome recurrent activation challenges that refiners encounter, namely:

- Temperature-limited reactors (operating below 600°F/315°C)
- Temperature excursions during activation
- Significant downtime due to significant H_2S breakthrough (noble metal catalysts, sour water)
- Handling of sulfiding agents, long dry out steps, and complicated in-situ activation, etc.

UltraCAT® Preactivation – European Case Study

A European refinery hydrotreated 100% Coker Naphtha with two reactors in series:

- The 1st reactor operates at low temperature (482°F/250°C) to partially saturate di-olefins and reduce sulfur content prior to the 2nd reactor
- The 2nd reactor is mainly dedicated for HDS purpose

UltraCAT® preactivation was applied in the 1st reactor to gently saturate the di-olefins at low operating temperature. Once the refinery reached the Start of Run (SOR) temperature of 482°F/250°C, they gradually introduced full coker Naphtha while getting expected performance. **UltraCAT preactivation** demonstrated its efficiency for low operating temperature unit without affecting the catalyst activity (see figures 2 & 3).

Applications

UltraCAT® is applicable to a wide range of hydroprocessing units, such as:

- Naphtha, Gasoil, ULSD, Kerosene
- CFH or FCC pretreat units, hydrocracker pretreat units, hydrocracking units
- Lube Oil, 2nd stage of PyGas Tail Gas hydrotreaters
- Claus Tail Gas Treating Units (TGTU)

UltraCAT preactivation was developed to provide a broad solution to converting catalysts to the sulfide state while offering the following benefits:

- Provide full activity for temperature limited units (<600°F/<315°C)
- Avoid temperature excursions and metal reduction during the start-up
- Minimize H2S generation for units sensitive to sulfur (noble metal catalysts)
- Avoid the use of sulfiding agents, long dry out steps, and complicated in-situ activation: Ready-to-use solution
- Provide **cracked feed protection**, which allows introducing the cracked feed immediately after the start-up

Figure 2: Coker naphtha unit (1st reactor start-up)

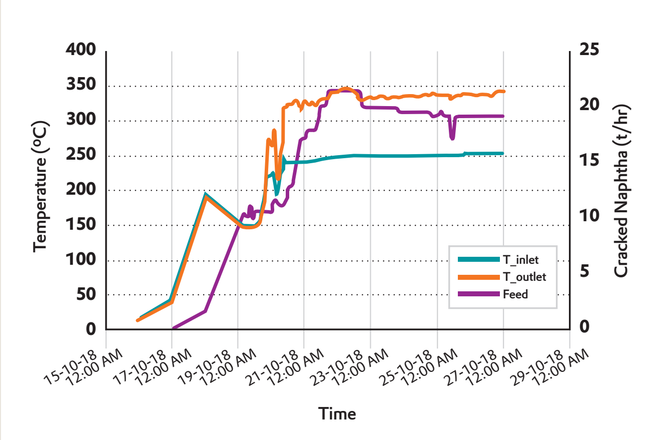
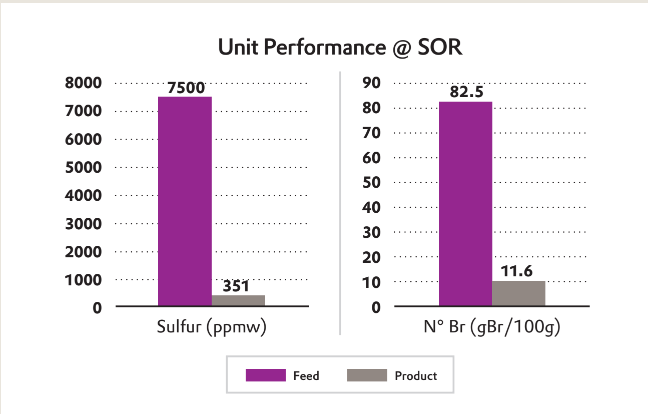


Figure 3: Coker naphtha unit (1st reactor SOR performance)



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