



Ketjenfine 870 STARS®

A more intelligent catalyst for boosting hydrocracker performance

Meeting the need for top-performing hydrocracking pre-treatment catalysts

In the current market scenario that rewards middle distillates production, many refiners are looking closely at the performance of their hydrocrackers.

To improve hydrocracking margins, refineries explore solutions ranging from increasing feed severity to improving yield structure and product quality. Multiple operational constraints — in particular, cycle length and hydrogen availability — often determine the feasibility of each approach. At the same time, volatility of the market brings in the need for flexibility, or, in other terms, the capability to shift along the cycle between different production objectives.

In all cases, refiners can obtain significant improvements by applying the highly reliable and tailored catalytic solutions such as those offered by the UOP-Albemarle Hydroprocessing Alliance.

KF 870 STARS® — A more intelligent catalyst

KF 870 is the latest addition to Albemarle’s HC-PT portfolio, the most active NiMo hydrocracking pre-treatment (HC-PT) catalysts in the market.

This new, novel catalyst was specifically designed to enhance the HDN activity in the medium- to low- nitrogen slip region, where residual nitrogen is entirely constituted of refractory species. Refiners can exploit this feature by operating their hydrocracking unit at higher severity, boosting the volume swell and creating the ideal conditions to achieve the maximum performance from downstream cracking catalysts.

When compared to Albemarle’s previous generation of HC-PT catalysts, KF 868, KF 870 provides up to 30% more activity, allowing refiners to produce middle distillates with lower density and lower sulfur content without any drawback in terms of stability.



“We developed KF 870 after discussions with several refinery technologists who were looking for a new catalyst that could deliver excellent HC-PT performance. KF 870 is a breakthrough catalyst that provides unparalleled performance at the most severe process conditions”

Stefano Melis, Global Application Specialist

Unparalleled Performance, Higher ROI

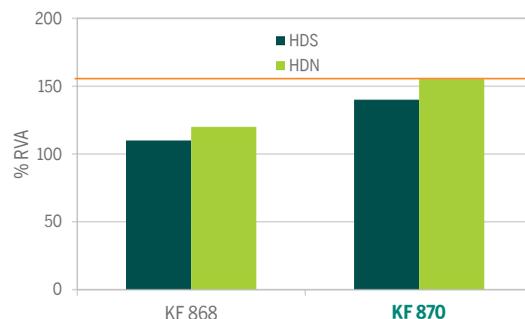


Figure 1: KF 870 HDN activity vs. KF 868

Complete portfolio of HC-PT catalysts to meet Any refining objective

Albemarle’s portfolio for hydrocracking pretreatment includes many different catalysts (each available in two different sizes), providing a solution for any refining objective in terms of activity, stability, hydrogen consumption and pressure drop.

These catalysts can be sequenced in many different ways according to Albemarle’s proprietary STAX® technology (optimal catalyst system design technology) to generate tailored solutions for specific customer requirements.

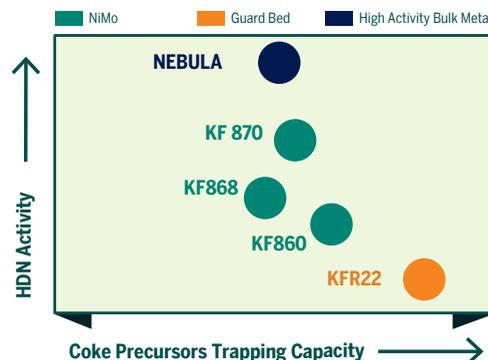


Figure 2: Albemarle’s hydrocracking pre-treatment portfolio

Albemarle's HC-PT STAX® Solutions

Albemarle has developed its own proprietary approach to catalyst system design: STAX®. In a traditional approach, hydrocracking pre-treatment has two zones : the top of the reactor is filled with grading/demetallization catalyst, and the rest of the reactor is filled with a single active catalyst.

Albemarle's approach, based on years of research and development and a wealth of experience gained through commercial unit evaluations, is markedly different. The basic principle is that each reactor zone is exposed to an oil product of a different quality so that the reactions taking place in each zone are very different.

Albemarle sees hydrocracking pre-treatment as generally having four different zones that, depending on specific situations, can vary in length and location:

1. The first zone (Zone A) only exists for extremely heavy feeds — for example, those with an asphaltene content exceeding 500 ppm or an end boiling point higher than 650°C (1,200°F). For such conditions, Albemarle recommends KFR 22, which combines hydrodemetallization activity and efficient removal of asphaltenes and Conradson carbon residue (CCR).
2. Although by Zone B the feed is partially cleaned up, stability is still the main problem, so a robust catalyst is required. In most cases, KF 860 STARS is applied, which delivers excellent HDS, HDN and robustness.
3. Zone C is perhaps the zone that reflects the most typical perception of hydrocrackers. Here, the only critical performance characteristic is HDN activity, so KF 870 is the optimal solution.
4. Zone D, the final zone, is where product nitrogen is typically below 100 ppm. Here, conversion of the most difficult nitrogen molecules occurs. The catalyst selection for this zone therefore depends on unit objectives and hydrogen availability. Typically, a high-activity HDN catalyst such as Albemarle's new KF 870 STARS is selected. When extreme performance is desired, Albemarle recommends its highest activity catalyst, NEBULA 20

A visual representation of the general HC-PT STAX concept is shown in Figure 3, followed by the technical benefits of utilizing KF 870 in various configurations to boost your Hydrocracker performance in Figure 4.

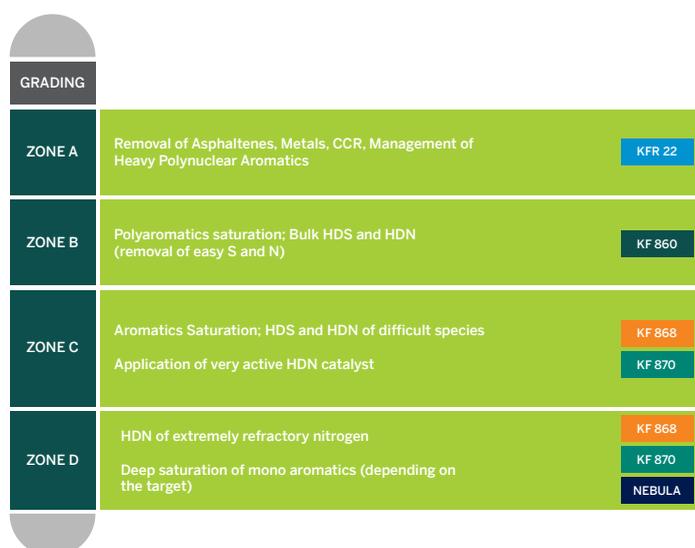


Figure 3: Concept behind HC-PT STAX technology

Utilizing Albemarle's HC-PT portfolio to meet specific refinery objectives

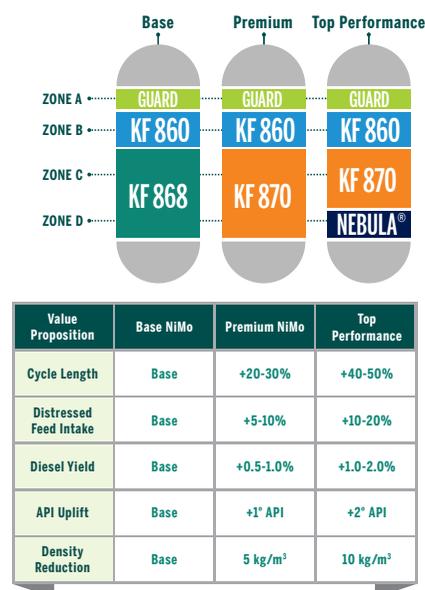


Figure 4: Benefits of various HC-PT catalyst configurations

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