



Ketjenfine 780 STARS®

An all-rounder catalytic solution for distillate and VGO hydrotreating

KF 780 STARS — A more intelligent catalyst for both diesel and VGO hydrotreating

KF 780 is the latest addition to Albemarle’s hydroprocessing catalyst portfolio and is ideal for cascading in different applications. KF 780 is applicable as both a standalone catalyst and in various STAX® configurations, utilizing Albemarle’s proprietary reactor loading technology.

KF 780 is a high-activity desulfurization catalyst in the STARS catalyst family with an extremely high metals efficiency. This step-out feature was achieved via improved metals dispersion and tailored distribution of active sites coupled with better pore accessibility.

This new, novel catalyst was specifically designed to achieve very high stability — in even the most demanding conditions — throughout the entire commercial cycle.

KF 780 has close to 100% Type II active sites which, in combination with its high metal efficiency, give it exceptional activity and stability in VGO hydrotreating applications. Higher activity catalyst solutions help refiners overcome constraints and exploit opportunities.

VGO STAX® FCC-PT Solutions

FCC-PT operations typically only have two reaction zones that vary in length and position during the operating cycle.

Catalyst application strategy must account for reaction Zone 1 growth and Zone 2 shrinkage throughout the cycle, as well as feed properties, operating conditions, constraints and product targets. Depending on refinery objectives, conversion may also be a target.

	ZONE 1 (30–60 VOL%)	ZONE 2 (40–70 VOL%)
H ₂ partial pressure	Higher	Lower
Main HDS reaction Main HDS inhibitor	Direct H ₂ S	Direct + hydrogen Organic nitrogen
Main HDN/HDA reaction Main HDN/HDA inhibitor	Hydrogenation Org. nitrogen, aromatics	Hydrogenation Org. nitrogen, aromatics
HDS reaction rate HDN/HDA reaction rate	Fast Very Slow	Slow Slow
Preferred catalyst types (general guidance may vary for specific cases)	CoMo (Low-Med P) (Ni)CoMo (Med P) NiMo (High P)	CoMo (<55 bar ppH ₂) (Ni)CoMo (Med ppH ₂) NiMo (>90 bar ppH ₂)

Table 1: VGO STAX® FCC-PT system design for robust operations



“KF 780 STARS, Albemarle’s premier all-rounder hydrotreating catalyst, is built on our history of innovation and commitment to our customers. Its operational flexibility and economical fill cost make it ideal for refiners looking to expand their margins.”

Luca Moraca
Business Director, VGO FCC-Pretreatment

Unparalleled Performance, Higher ROI

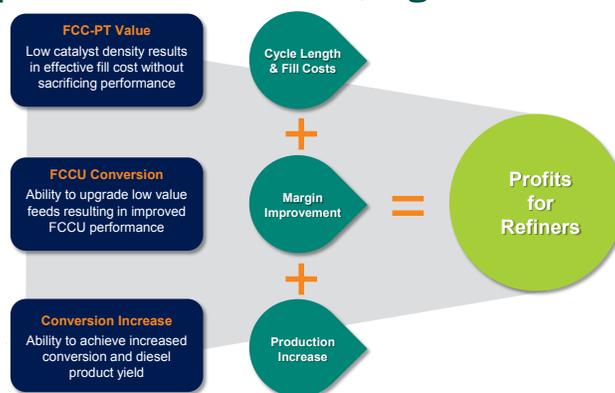


Figure 1: KF 780 gives value to refiners at all H₂PP levels.

FCC-PT catalysts for any refining objective

Albemarle’s portfolio for FCC 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 deployed in many different ways according to Albemarle’s proprietary VGO STAX® FCC-PT technology to generate tailored solutions for specific customer requirements.

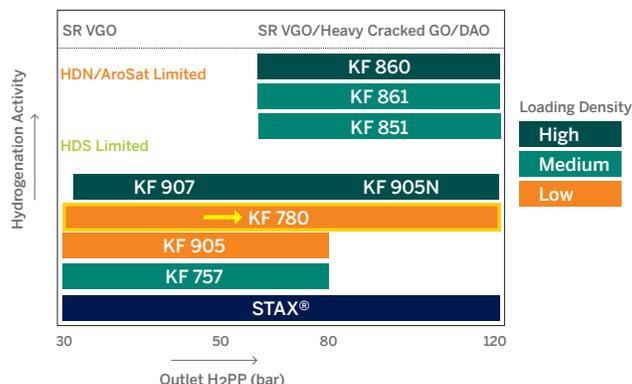


Figure 2: Albemarle’s FCC pre-treatment portfolio

KF 780 STARS — The new flexible performer for middle distillates hydrotreating

KF 780 is a flexible performer catalytic solution, both as a standalone catalyst and in various STAX® configurations, utilizing Albemarle's proprietary reactor loading technology.

KF 780 is ideal for low- and medium-pressure middle distillates operations and gives refiners operational flexibility at a competitive fill cost. KF 780's main features are high DDS/HYD high DDS/HYD selectivity, boosted metals efficiency and excellent pore mouth accessibility.

KF 780 is ideal in low- to medium-pressure middle distillates applications

KF 780 can be applied as a standalone solution and in STAX® configurations in all Middle Distillates HT applications, including SRGO/cracked stock/HGO blends as well as block mode VGO/LGO applications.

The unique features of KF 780 make it particularly suited for low-pressure (<30 bar PPH₂in) and medium-pressure (30-50 bar PPH₂in) middle distillates hydrotreating, particularly where H₂ availability, feed quality, high operating temperature and thermodynamic limitation are a constraint for hydrogenation reactions.

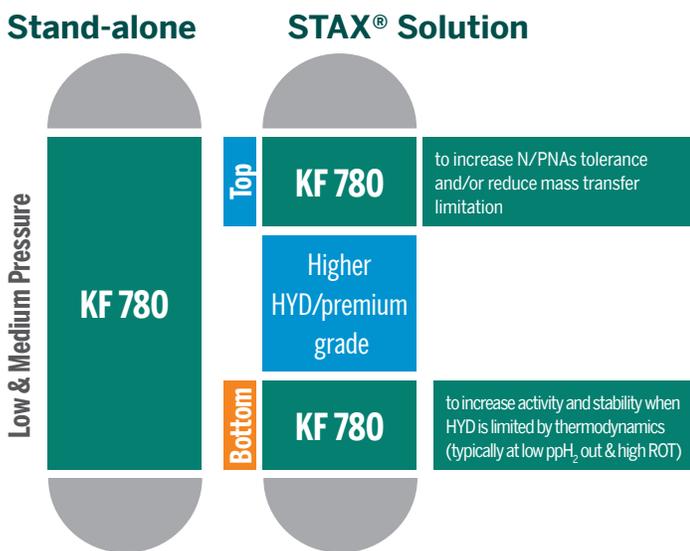


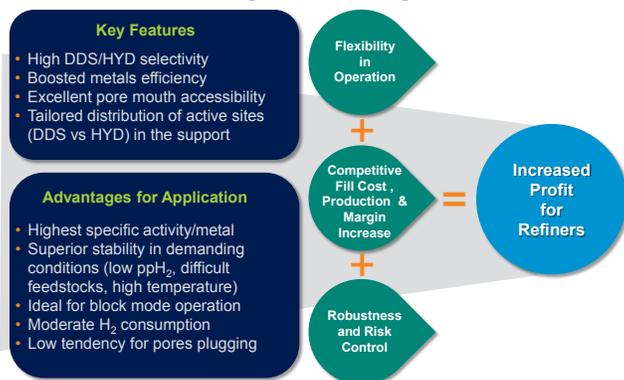
Figure 3: KF 780 is a versatile, all-rounder catalyst.



"KF 780 STARS, provides outstanding metals efficiency at a competitive fill cost as well as very high stability — even in demanding conditions — throughout the whole commercial cycle."

Peter-Paul Langerak
Business Director, Distillates

Operational flexibility at a competitive fill cost



An extensive ULSD catalyst portfolio for any objective

Albemarle's ULSD catalyst portfolio contains an extensive array of catalyst functionalities that enable customizable catalyst system solutions to fit any possible combination of unit performance objectives and constraints.

Albemarle employs STAX® technology to generate tailored solutions for specific customer requirements.

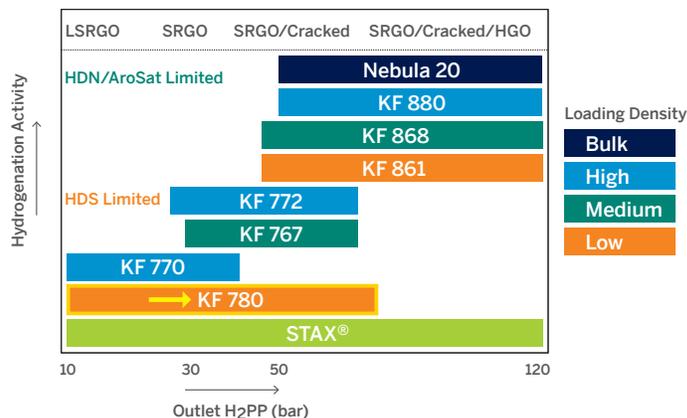


Figure 4: Albemarle's distillates hydrotreating portfolio

For more information on this or other Albemarle products and technologies, please contact your Albemarle representative.

AMERICAS

2625 Bay Area Blvd
Suite 250
Houston, TX 77058
USA

Tel: +1 281 480 4747
Email: catmaster@albemarle.com

EUROPE AND AFRICA

Nieuwendammerkade 1-3
1022 AB Amsterdam
The Netherlands

Tel: +31 20 634 7300
Email: catmaster@albemarle.com

MIDDLE EAST AND INDIA

PO Box 293774
6W Block A, Office 512
Dubai Airport Free Zone
Dubai

Tel: +971 4 701 7770
Email: catmaster@albemarle.com

ASIA PACIFIC

Building 6, A-Sun Science & Technology Park
Lane 399 Shengxia Road
Pudong, Shanghai 201210
China

Tel: +86 21 6103 8666
Email: catmaster@albemarle.com

www.albemarle.com

The information presented herein is believed to be accurate and reliable, but is presented without guarantee or responsibility on the part of Albemarle Corporation. It is the responsibility of the user to comply with all applicable laws and regulations and to provide for a safe workplace. The user should consider any information contained herein, including information about any health or safety hazards, only as a guide, and should take those precautions that are necessary or prudent to instruct employees and to develop work practice procedures in order to promote a safe work environment. Further, nothing contained herein shall be taken as an inducement or recommendation to manufacture or use any of the herein described materials or processes in violation of existing or future patents. © 2016 Albemarle Corporation. All rights reserved worldwide.