



RiFT

Real Performance. Where It Counts.

The world's maximum bottoms upgrading FCC catalyst just got better.

Built upon a Legacy

Albemarle's high accessibility, high activity catalysts that employ ADM™-20 matrix are renowned in the industry for their bottoms destruction capabilities and highly olefinic product output. **RiFT** add-on matrix technology is built upon this benchmark catalyst legacy.

GEOLOGY: VERB:
*rift (verb) geology; form fissures, cracks, or breaks, especially through large-scale faulting; move apart*¹

Resid improvement Fracture Technology (RiFT)

RiFT – also known as FT– is bolt-on technology that can be applied across feed types and used in conjunction with Albemarle catalysts like **UPGRADER™** and **ACTION™**. Whether a refiner is striving to minimize fuel oil production or is seeking additional bottoms upgrading capabilities when cracking difficult feed, **RiFT** is the technology of choice. Unlike alternate catalyst technologies, utilizing **RiFT** does not require a compromise on physical properties.

Pore Size Distribution

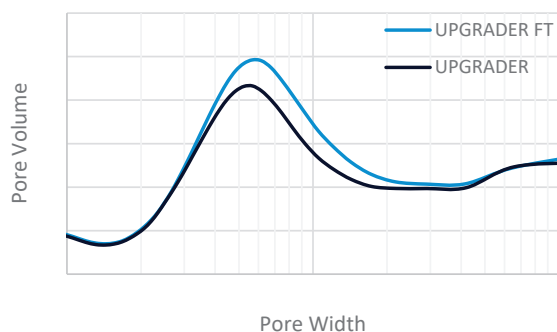


Figure 1: RiFT delivers expanded pore size distribution.

Expanded Pore Size Distribution

RiFT matrix delivers enriched PoSD which presents favorable implications for bottoms cracking and hydrogen transfer.

More Acid Sites, Lower Hydrogen Transfer

RiFT matrix also delivers supplementary acid sites, increasing total catalyst acidity by up to 20%.

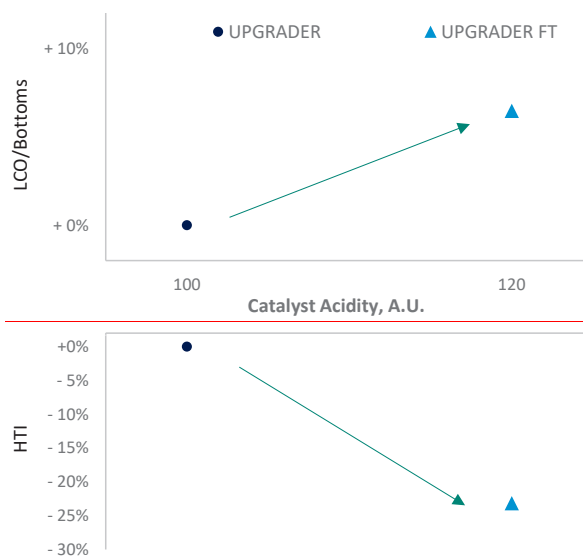


Figure 2: RiFT matrix delivers higher catalyst acidity, improved bottoms upgrading, and lower hydrogen transfer.

Laboratory Study

ACE testing conducted on cyclic deactivated samples of **UPGRADER** and **UPGRADER FT** with 3000 ppmw nickel and 3000 ppmw vanadium showed 0.4 wt% lower bottoms at constant coke.

Note that differences in bottoms cracking are attenuated in ACE testing versus commercial result.

	UPGRADER	UPGRADER FT
Activity, wt%	77.6	78.0
Conversion, 430 °F+	79.0	79.0
Coke, wt%	8.3	8.3
Dry gas, wt%	3.2	3.2
LPG, wt%	19.3	18.8
C3=/C3s	0.850	0.850
C4=/C4s	0.650	0.657
Gasoline (C5–221°C), wt%	48.1	48.7
LCO (221–400°C), wt%	14.3	14.7
Slurry, wt%	6.7	6.3

Table 1: ACE test results of UPGRADER and UPGRADER FT.

¹ Oxford Dictionaries.

Reduced Bottoms by 0.8 vol%

A refiner operates an FCC equipped with high-efficiency combustor regenerator and cat cooler. The unit is processing atmospheric tower bottoms and aiming to maximize LCO and gasoline, minimize slurry and dry gas, all while operating within an LPG constraint.

In the above case, the **RiFT** catalyst performed superbly, resulting in a 0.8 vol% reduction in slurry, +1.0 vol% extra LCO, and less but more olefinic LPG.

	UPGRADER	UPGRADER FT
Dry gas, wt%	Base	-0.1
LPG, vol%	Base	-0.2
C3=/C3s	Base	+0.4
C4=/C4s	Base	+1.0
Gasoline, vol%	Base	+0.2
LCO, vol%	Base	+1.0
Slurry, vol%	Base	-0.8

Table 2: Commercial results of UPGRADER FT, normalized for feed quality and conditions.

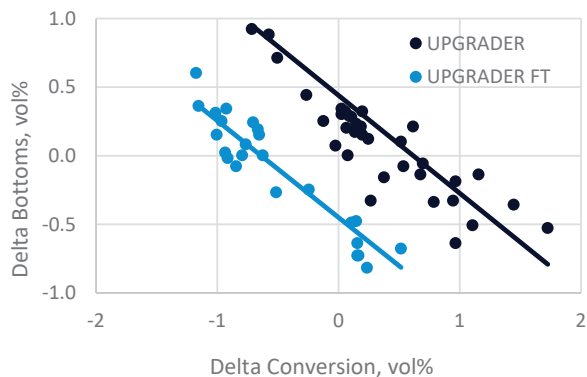


Figure 3: UPGRADER FT offers distinct bottoms upgrading improvement.

Tried and Tested

Several trials have either been concluded or are in progress in FCC units processing residue and/or exclusively VGO feeds. These are units of varying design, but without exception are operated by world-class refiners who strive to maximize LCO and gasoline and benefit from increased C4 olefins (Alkyl operations, for example).

RiFT-enabled Albemarle Catalysts Deliver:

- Enhanced bottoms cracking
- Improved C4 olefinicity
- Constant delta coke
- Expanded pore size distribution
- Same high accessibility

World-class Technical Service

In addition to high performance product offerings, the extended Albemarle technical service team provides rapid laboratory testing of E-cat samples, periodic technical service reviews, as well as advanced assistance in troubleshooting and unit optimization to help refiners maximize margin from their FCC unit.

The Albemarle FCC technical service group consists of global professionals with a variety of experience in FCC unit design, operations and modeling, catalyst research, and manufacturing.

FOR MORE INFORMATION ON THIS OR OTHER ALBEMARLE PRODUCTS AND TECHNOLOGIES, PLEASE CONTACT YOUR ALBEMARLE REPRESENTATIVE.

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