



EVEREST AND EVEREST ACTION

Real Performance. Where It Counts.

New technology from the innovative leader in FCC

Albemarle understands that refiners today are faced with an array of challenges to profitable operation in the form of difficult feeds, frequently changing market conditions, and increasingly stringent environmental regulations, all of which exert downward pressure on refining margins. Into this highly competitive environment, Albemarle introduces **GRANITE™** technology, providing the most flexible, effective portfolio of tunable catalyst and additive products available.

GRANITE technology features several new catalyst lines, including **EVEREST™** and **EVEREST ACTION™**, employing the recently unveiled **ADM-85** matrix/binder technology, expanding the formulation window to allow higher concentrations of premium active components and providing improvements in zeolite stability and coke selectivity.

EVEREST: Building on the superior bottoms upgrading, metals resistance, and gasoline quality of UPGRADER

Building upon Albemarle's long established and highly successful UPGRADER catalyst line, with its superior bottoms upgrading, metals resistance, and gasoline quality, **EVEREST** offers improvements in each of these areas using the improved binding provided by **ADM-85** to pack the catalyst with even more of the quality, active components that drive yields and profits, while maintaining or improving catalyst physical properties and attrition resistance. Additionally, catalysts formulated with ADM-85 feature improved coke selectivity and enhanced zeolite stability.

Table 1 compares the yield results between a conventional UPGRADER catalyst with the analogous **EVEREST** formulation (featuring a more aggressive formulation made possible by the improved binding of ADM-85) in a commercial resid unit processing a feed exhibiting a CCR concentration of 2.5%, with a combined Ni + V concentration on e-cat of > 12000 ppm.

Significant improvements in gasoline and LCO yield are apparent, as well as dry gas and bottoms upgrading. The improvement in coke selectivity is reflected in the reduced regenerator dense phase temperature.

While this particular **EVEREST** formulation is designed to maximize gasoline yield and limit LPG production, the flexible formulation space afforded by **ADM-85** allows for an array of differently designed catalysts targeting a variety of unit objectives and constraints.

	UPGRADER	EVEREST
Regen Temp, degF	base	-9
Conversion, v%	base	+0.6
H ₂ , wt%	base	-8% relative
LPG, v%	base	-1.0
Gasoline, v%	base	+1.1
LCO, v%	base	+0.3
Bottoms, V%	base	-0.9

Table 1: Comparison of EVEREST to UPGRADER in a commercial operation, performed at identical feed quality, operating conditions, and catalyst addition

EVEREST ACTION: Enhanced butylene and gasoline octane in a highly coke selective catalyst with improved zeolite stability

As in the case of **EVEREST**, **EVEREST ACTION** also exhibits improved physical properties that open a wider catalyst formulation window, allowing for the inclusion of higher levels of premium active components. **EVEREST ACTION** utilizes **ADZT-100**, the shape selective zeolite technology system associated with Albemarle's commercially proven and highly successful ACTION product line. Furthermore, due to the benefits of **ADM-85**, with the associated higher maximum zeolite levels and greater zeolite stability, these components are incorporated into a high activity catalyst with only a modest amount of RE, with the additional butylene and octane bonuses that entails.

Results from ACE testing for **EVEREST ACTION**, referenced against a conventional UPGRADER™ catalyst, and compared to UPGRADER with ZSM-5 additive and a conventional ACTION formulation, demonstrate a remarkable increase in butylene yield (Figure 1).

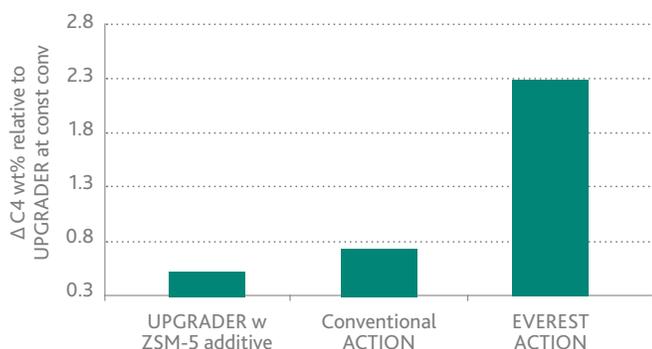


Figure 1: Δ C4= wt% for EVEREST ACTION relative to both UPGRADER with ZSM-5 additive and conventional ACTION in ACE testing

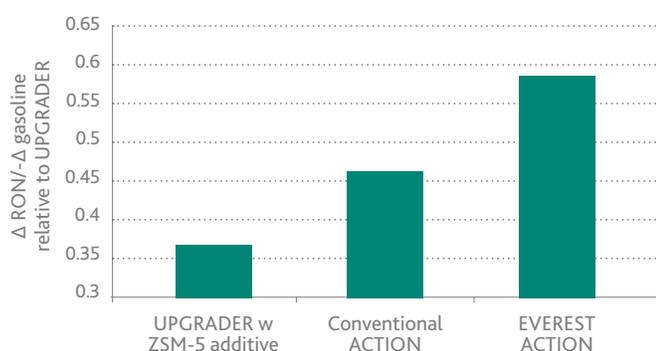


Figure 2: Δ RON / - Δ gasoline for EVEREST ACTION relative to both UPGRADER with ZSM-5 additive and conventional ACTION in ACE testing

EVEREST ACTION also represents step-out improvement in gasoline octane barrels. Figure 2 compares the octane gain per unit of gasoline lost for each catalyst relative to the UPGRADER reference. Both ACTION catalysts show a distinct benefit relative to UPGRADER benchmark, both with and without ZSM-5 additive, but the **EVEREST ACTION** shows a marked improvement even relative to the conventional ACTION, itself widely recognized and employed as the premium gasoline octane catalyst.

Additionally, the **EVEREST ACTION** catalyst yields 15% less coke relative to both the UPGRADER and conventional ACTION against which it is compared, along with a 30% higher zeolite retention in lab-scale steaming. Both of these results are typical of catalysts bound with **ADM-85**, which consistently yield marked improvements in coke selectivity and zeolite stability compared to analogous catalysts using more conventional binders.

EVEREST ACTION is the catalyst of choice for targeting high butylene yields and octane barrels, while providing superior bottoms upgrade with excellent coke selectivity.

EVEREST and EVEREST ACTION: Powerful new additions to the Albemarle catalyst portfolio

EVEREST and **EVEREST ACTION** represent two new premium, step-out FCC catalyst lines from the innovative industry leader to optimize yield slates and maximize profits across a wide variety of feed types, operational constraints, and yield objectives.

For more information on these or other Albemarle products, contact your Albemarle representative.

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

AMERICAS: 13100 Space Center Blvd • Houston, TX 77059 • USA • Tel: +1 281 480 4747 • Email: catmaster@albemarle.com

EUROPE AND AFRICA: Nieuwendammerkade 1-3 • 1030 BE Amsterdam • The Netherlands • Tel: +31 20 634 7300 • Email: catmaster@albemarle.com

MIDDLE EAST AND INDIA: PO Box 293774 • 6W Block A, Office 201, 2nd Floor • Dubai Airport Free Zone • Dubai • Tel: +971 4 701 7770 • Email: catmaster@albemarle.com

ASIA PACIFIC: Room #3202, Gopher Center • No. 757 Mengzi Road • Huangpu, Shanghai 200023 • China • Tel: +86 21 6103 8666 • Email: catmaster@albemarle.com

www.albemarle.com

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