

GRACE

NEKTOR™ 4G

NEKTOR™ 4G is the latest generation of Grace's market-leading low coke NEKTOR™ for residue FCC feed applications.

NEKTOR™ 4G is manufactured using the Grace EnhanceR™ Technology Platform, and is an extension of the NEKTOR™ catalyst family, which is the market leader in the EMEA region (Fig. 1).

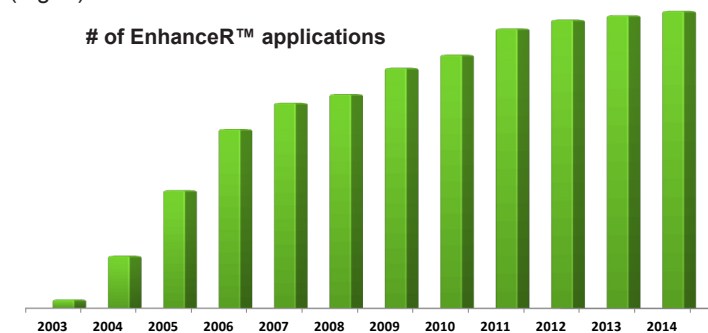


Fig. 1. NEKTOR™ is the leading technology in EMEA for low delta coke applications.

NEKTOR™ 4G incorporates new technologies that were developed during the extensive Grace R&D program that was initiated as a result of the tight oil boom in North America and the new challenges faced by European refineries.

This R&D program resulted in advances to the following five functionalities:

- Higher Diffusivity Matrices
- Flexible Hydrogen Transfer
- Higher Activity
- Advanced Metals Tolerance
- Dual Zeolite Functionality.

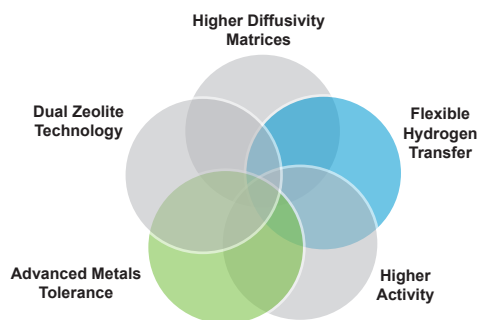


Fig. 2. New functionalities utilized in NEKTOR™ 4G.

NEKTOR™ 4G Case Study

NEKTOR™ 4G was successfully used in a coke-burn limited FCC unit. NEKTOR™ 4G's lower delta coke relieved the regenerator bed temperature constraint. Cat/oil increased by +0.5 and the unit conversion by +0.7wt%. The refinery was able to use the improved delta coke to process heavier feeds, which in turn boosted profitability by approximately \$5/MT.

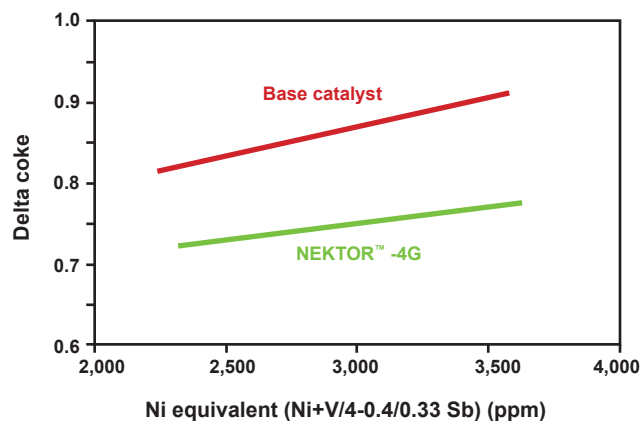


Fig. 3. NEKTOR™ 4G enabled heavier feed processing through lower delta coke.

Normalised shifts vs base	
Conversion	+0.7 wt%
C1+C2	-0.5 wt%
C3+C4	+1.3 wt%
Gasoline	-0.1 wt%
LCO (wt%)	-0.5 wt%
Slurry	-0.2 wt%
Regenerator T(°C)	-16°C
Cat/Oil	+0.5
Unit profitability	+ \$5/MT feed

Table 1. NEKTOR™ 4G improved unit profitability by \$5/ton feed by allowing greater flexibility to process heavier feed in Refinery A.

NEKTOR™ 4G catalysts bring the following performance benefits to unit operations:

- lowest delta coke for heavy metal feeds
- excellent coke to bottoms performance
- high intrinsic activity and stability
- excellent attrition resistance.

NEKTOR™ 4G catalysts are fully compatible with all Grace additives.

Technical Service

An equally critical component associated with processing challenging feeds is solid technical service support. Grace has been providing industry-leading technical service to the refining industry since 1947.

Grace's experienced engineers support FCC customers with:

- Application and operations expertise
- Start-up and optimization assistance
- Industry benchmarking
- Feed characterization and pilot plant studies

Understanding feed impacts earlier allows opportunity to optimize the operating parameters and catalyst management strategies, enabling a more stable and profitable operation.

Innovation

NEKTOR™ 4G is the latest in a long line of Grace's innovation in catalyst technology, and is the product of Grace's global team of research scientists.

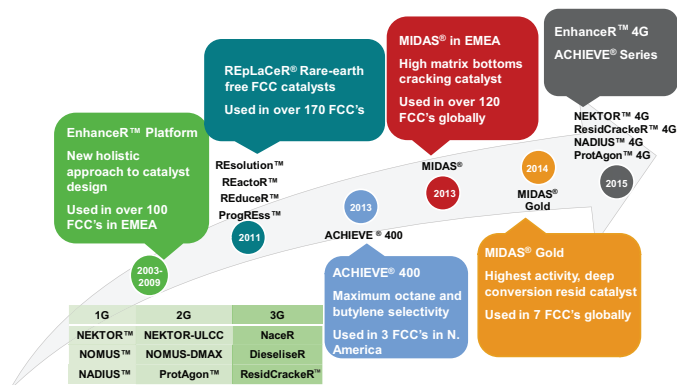


Fig. 4. NEKTOR™ 4G catalysts result from Grace's innovation in FCC catalyst technology.

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