FÁBRICA CARIOCA DE CATALISADORES

UPGRADER™ MD

Higher LCO production under different feedstock and operational severities at UFCC

Due to the increase in demand for diesel and the intensification of pressure on refining margins, FCC S.A. developed a specific configuration of catalysts within the UPGRADER™ MD platform aimed at maximizing LCO production. This approach consistently enhances UFCC's contribution to the refinery's diesel pool while simultaneously preserving bottoms conversion, operational stability of the unit, and product quality.

The UPGRADER™ MD catalysts are designed to operate robustly across a wide range of feedstock and operational severities, providing refiners with the flexibility to respond to different market scenarios and processing strategies. The formulations are suitable for both diesel fuel processing and residual fraction processing, maintaining reliable performance even under the most demanding operating conditions.

The MD approach combines high selectivity for LCO formation with high bottoms conversion and superior resistance to metal deposition, ensuring catalytic stability throughout the cycle and operational predictability.

Winning combination

The superior performance in middle distillates results from the balance between high primary cracking activity and control of secondary cracking, made possible by a highly accessible pore architecture.

FCC S.A. achieves this balance through: (i) the increase in the ratio of the activity of the matrix to the zeolite, (ii) the application of proprietary technologies that make the catalyst highly accessible to high-molecular-weight molecules.

The catalytic activity is effectively distributed throughout the matrix, which is structurally optimized to facilitate molecular transportation. As a result, there is a direct increase in the LCO/bottoms ratio, as shown in Figure 1.

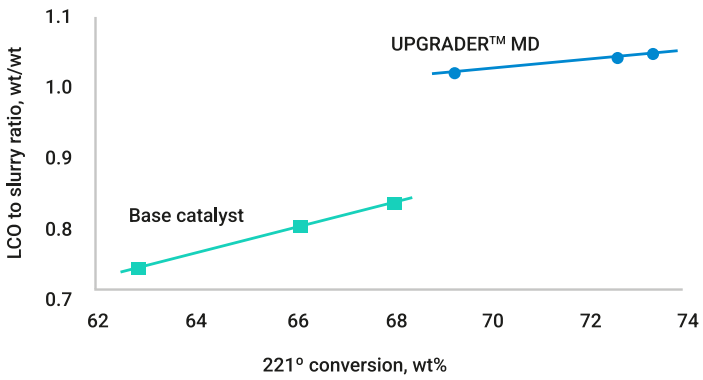

Figure 1: Effect of UPGRADER™ MD on the LCO/bottoms ratio, (m/m %).

In commercial operation, this performance translates into a product distribution profile with higher added value, maintaining adequate conversion levels to LCO, without penalizing bottoms conversion. Additionally, these catalysts allow for the processing of progressively heavier feedstock.

Maximum accessibility and bottoms conversion rate

The greatest potential for accessibility and bottoms cracking is achieved with the UPGRADER™ MD, designed for processing more challenging residual feedstock.

The advanced high-accessibility manufacturing technology of FCC S.A. gives the UPGRADER™ MD unique molecular diffusivity characteristics, particularly relevant for the processing of heavy residues.

The accessibility of the catalyst is quantified through the Ketjen Accessibility Index (KAI), a laboratory parameter that measures the catalyst's ability to diffuse large molecules within its pore system. The values obtained for the UPGRADER™ MD, both in the fresh state and in equilibrium at the UFCC, are more than double those observed in conventional FCC catalysts.

This high level of accessibility also provides an additional benefit: greater catalytic stability, by mitigating the effects of pore blockage caused by metal deposition during the process.

Proven performance in FCC units

The MD family catalysts have already proven their value in commercial operations for various FCC S.A. clients. Some examples include:

- Figure 2 demonstrates the impact of a complete switch to the UPGRADER™ MD catalyst in an FCC unit processing residues. A structural change in the operational regime is observed, significantly favoring the production of LCO. In this case, moderate conversion levels were adopted, resulting in LCO yields between 30 and 35% in volume.

These examples demonstrate the versatility of the MD catalyst line, capable of adapting to specific local conditions, maximizing economic benefits. With the continuous growth of global demand for high-quality diesel, the MD family remains a strategic pillar for refineries seeking competitiveness and operational flexibility. FCC S.A. continues to invest continuously in the development of increasingly advanced catalysts, anticipating the challenges of the future of refining.

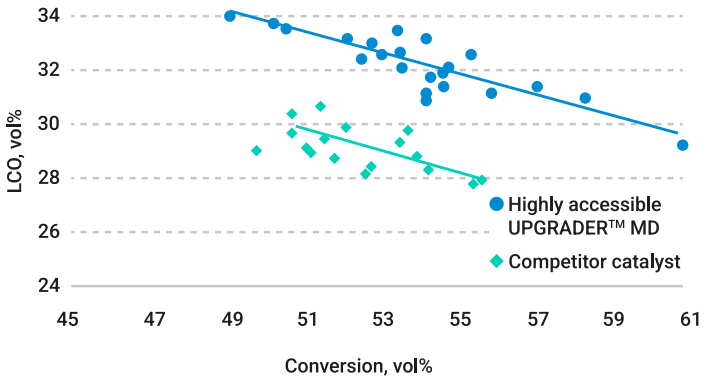

Figure 2: The UPGRADER™ MD catalyst showed higher diesel yield compared to the competitor's catalyst.

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For more information, contact the FCC S.A. Technical Services team

About FCC S.A.

FCC S.A is a leading-edge technology company, with headquarters in Rio de Janeiro, comprising the Petrobras S.A. and Ketjen companies. Being the sole manufacturer of catalytic cracking catalysts and additives for petroleum refining in the South-American market, its consumer customers are the refineries of the Petrobras Systems, as well as the petroleum refineries of South-American countries.

Rua Nelson da Silva, 663 | Distrito Industrial de Santa Cruz | CEP: 23565-160 - Rio de Janeiro - RJ - Brasil | www.fccsa.com.br