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Performance Profile

ZIP Olefins Additive

Refinery trial of the olefins additive shows success in maximizing FCC propylene production.

BASF's Fluid Catalytic Cracking (FCC) Olefins Additive, ZIP, produces maximum propylene while using less Olefins Additive.

ZSM-5 based additives are used in Fluid Catalytic Cracking (FCC) units to crack gasoline molecules (C6–C9) to LPG olefins (C3 and C4) and to enhance octane levels in the remaining gasoline. ZIP is an improved additive that incorporates unique multi-stage phosphorous treatment to create more propylene producing acid sites.

Goal

CEPSA's La Rábida Refinery operates an FCC unit in Huelva, Spain. This unit is capable of producing >11 wt% propylene (compared to 4–6 wt% propylene produced by conventional fuels-based FCC units). The refiner's goal is to maximize propylene production while using less olefins additive.

Plan

BASF proposed ZIP olefins additive developed for maximizing propylene while diminishing the activity dilution of the base catalyst. ZIP employs multi-stage phosphorus treatment which enhances ZSM-5 zeolite stabilization and generates more propylene producing acid sites. A statistical model was developed to predict propylene yield based on CEPSA's operating data. Figure 1 shows the projected propylene by this model for BASF's Maximum Olefins Additive (MOA). The model is consistent with the actual propylene yield. ZIP was added in the Maximum Propylene Solution (MPS) catalyst formulation in place of MOA to assess its performance.

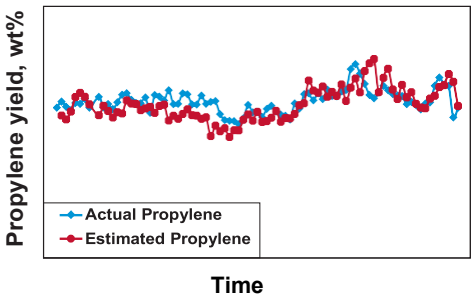

Figure 1. Actual Propylene Yields vs Statistical Model Predictions

Results

ZIP produced comparable propylene yields for CEPSA's operating conditions and feed quality while consuming 3 wt% less ZSM-5 additive.

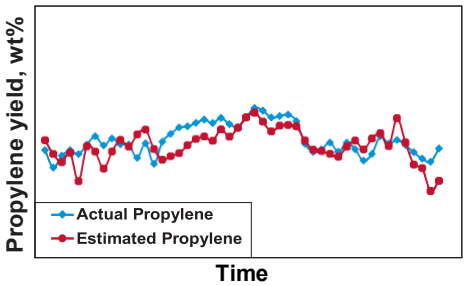

Figure 2. ZIP Achieves Similar Propylene Yields Using Less ZSM-5

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ZIP's ability to generate more LPGs and maximize propylene yield while using significantly less additive ensures minimal activity dilution of the base catalyst. Moreover, ZIP's performance shined even when the feed quality deteriorated during the trial. ZIP's exceptional capabilities are the result of its additional propylene generating acid sites.

After the conclusion of the trial, and based on the profitability of the unit, CEPSA La Rábida chose to continue using ZIP Olefins Additive.

About Us

BASF Refinery Catalysts is a global industry leader in fluid catalytic cracking (FCC) catalysts and additives, with an unparalleled commitment to delivery of cutting-edge technology and services to the refining industry. As part of BASF, BASF Refinery Catalysts is leveraging its leading development platforms, global research infrastructure and passionate pursuit of innovation to develop novel, proprietary product and digital service technologies to help customers achieve their objectives and meet the challenges of the market.
BASF Refinery Catalyst offers the highest degree of product flexibility in terms of surface area, zeolite/matrix ratio, metal traps, and particle size distribution. Its FCC catalysts offer not just a wide range of cost-effective solutions, but also the ability to deliver value through tailored products and services.
BASF Refinery Catalyst continuously commercializes new technology innovations to meet evolving customer needs and continuous product improvement. The award-winning Valor technology, Boron Based Technology (BBT) and Distributed Matrix Structure (DMS) technology are leaders in the market. Unique market solutions are achieved with the Multiple Framework Topology (MFT) technology, Improved Zeolite Y (IZY) technology, Proximal Stable Matrix & Zeolite (Prox-SMZ) technology and our Advanced Innovative Matrix (AIM) technology.

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BASF-10433 Rev. 11/2020