

# ZIP Olefins Additive

## Refinery trial of new ZSM-5 olefins additive shows success in maximizing FCC propylene production.



### Performance Profile

ZIP, BASF's latest Fluid Catalytic Cracking (FCC) Olefins Additive, produces maximum propylene while using less ZSM-5 Additive.

ZSM-5 based additives are used in Fluid Catalytic Cracking (FCC) units to crack gasoline molecules (C<sub>6</sub>-C<sub>9</sub>) to LPG olefins (C<sub>3</sub> and C<sub>4</sub>) and to enhance octane levels in the remaining gasoline. ZIP is an improved ZSM-5 additive that incorporates unique multi-stage phosphorous treatment to create more propylene producing acid sites.

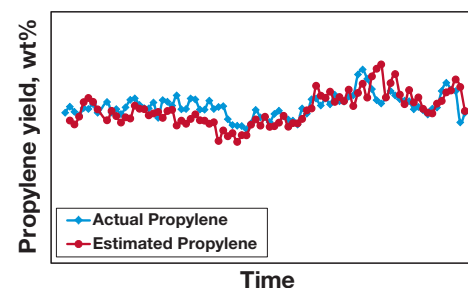
#### Goal

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 ZSM-5 additive.

#### Plan

BASF proposed ZIP, a new ZSM-5 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 ZSM-5 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

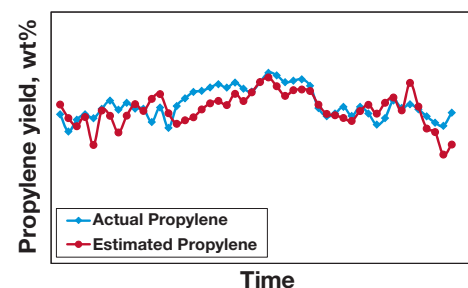
**Figure 1. Actual Propylene Yields vs Statistical Model Predictions**



#### 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**



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.

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