



## ELIMINOx™ – Flexible combustion promotion with lower NOx emissions

ELIMINOx is Albemarle's most widely used non-platinum-containing combustion promoter. More than 20 refineries around the world have used it to provide excellent carbon monoxide (CO) oxidation and to control afterburn with significantly lower NOx emissions when compared with traditional platinum promoters. ELIMINOx is used by refineries in the USA to meet the lower NOx emission regulations resulting from consent decree agreements with the United States Environmental Protection Agency. It is commercially proven to provide many refiners with a reliable, low-cost and flexible combustion promoter solution.

ELIMINOx is also used by refiners that may not have local NOx emission regulations but that wish to export their equilibrium catalyst to countries that do have NOx regulations. Refiners in these areas often cannot use equilibrium catalyst containing platinum without exceeding their NOx emission limits.

In the regenerator, the coke (carbon) on the spent catalyst is burned to form carbon dioxide (CO<sub>2</sub>). During combustion of carbon to CO<sub>2</sub>, CO forms as an intermediate. The conversion of carbon to CO in the presence of oxygen occurs rapidly; however, the conversion of the CO to CO<sub>2</sub> can be rate limiting.

Under ideal conditions, the conversion of carbon to CO<sub>2</sub> occurs entirely in the dense bed of the regenerator, where the heat liberated from this reaction is absorbed by the surrounding catalyst particles. If CO is allowed to escape the dense bed, it continues to react with the available oxygen. When this occurs in the dilute phase, the cyclones, the plenum or even further downstream of the FCC regenerator, there is little or no catalyst present to absorb the heat generated. This leads to high temperatures in these areas, a phenomenon known as afterburn.

When unmitigated, the high temperatures associated with afterburn may cause serious metallurgical damage and lead to unexpected shutdowns and, consequently, significant losses. ELIMINOx reduces this risk by increasing (promoting) the rate of conversion of CO to CO<sub>2</sub> in the dense bed.

If an FCC unit is using a platinum-based combustion promoter, replacing it with ELIMINOx may be the first step toward reducing NOx emissions. Non-platinum combustion promoters such as ELIMINOx can effectively oxidize CO and control afterburn, but are generally much less active in oxidizing nitrogen compounds. Typically, NOx levels while using ELIMINOx are 40–70% lower than those observed with a platinum-based promoter. Figures 1 and 2 show the effectiveness of ELIMINOx in reducing NOx emissions from commercial FCC units.

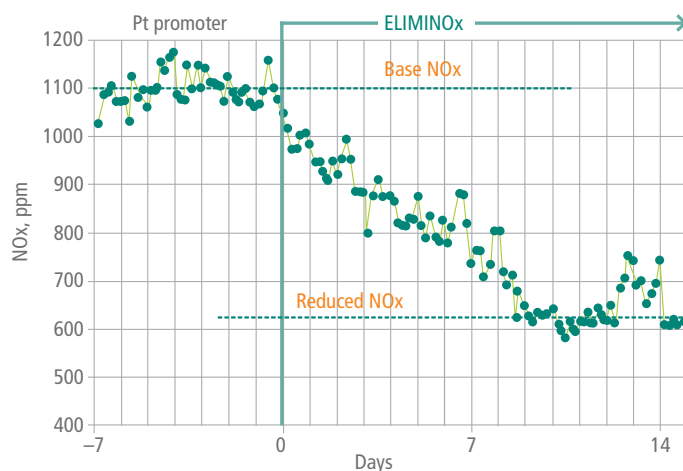
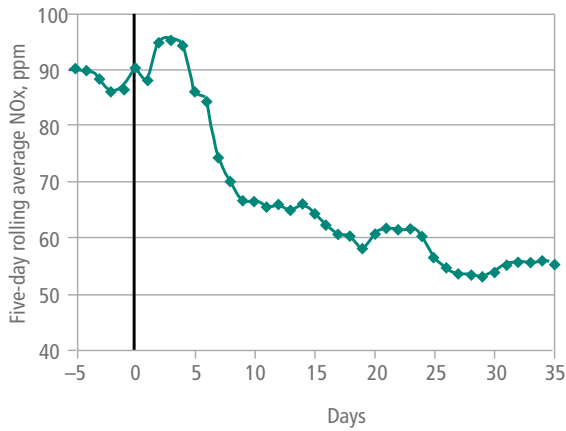


Figure 1: The reduction in NOx emissions by using ELIMINOx can be up to 70%. The 40% NOx reduction shown is typical.

**IF AN FCC UNIT IS USING A PLATINUM-BASED COMBUSTION PROMOTER, REPLACING IT WITH ELIMINOx MAY BE THE FIRST STEP TOWARD REDUCING NOx EMISSIONS.**





**Figure 2:** ELIMINOx reduced NOx emissions by 40% at constant afterburn control.

Typical product properties	
Additive name	ELIMINOx
Application	Low NOx combustion promotion
Attrition index, wt%	2.7
Average bulk density, g/ml	0.88
Surface area, m <sup>2</sup> /g	110
Particle size distribution (0–40), %	10
Particle size distribution (0–20), %	1



For more information on this or other Albemarle products and technologies, please contact your Albemarle representative.

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