



BCMT™-500

Accessible profitability for FCC

Too often, profitability is lost because refiners lack adequate accessibility and bottoms cracking power in their catalyst. Albemarle has developed BCMT-500 additive, which features high accessibility and provides powerful functional bottoms conversion sites. BCMT-500 delivers many pre-cracking sites and high metals tolerance, while making up only a small fraction of the circulating catalyst inventory.

Contaminant metals such as nickel, sodium, vanadium and calcium destroy the acidic cracking sites of the catalyst inventory and catalyze dehydrogenation reactions. Modest amounts of calcium and inorganic iron form layers around the catalyst particle that act as barriers between the feed and the active sites. As a result, the accessibility, as measured by the Albemarle Accessibility Index (AAI), drops. Consequently, the larger feed molecules are no longer adequately converted once the AAI drops below its critical value. Left untreated, severe cases of iron and/or calcium poisoning result in conversion losses as high as 10 vol% (see Figure 1).

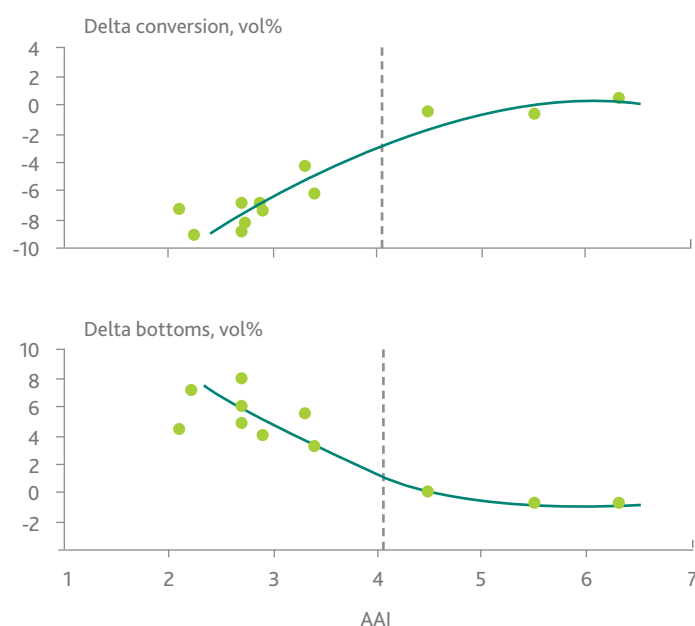


Figure 1: Loss of conversion caused by too low an AAI as a result of iron contamination

How does BCMT-500 work?

BCMT-500 provides an immediate remedy for boosting bottoms cracking power by counteracting the effects of increased metal contamination or the equilibrated accessibility index of the base catalyst being too low. Instead of waiting weeks or months for the contaminant metals to be flushed from the unit, the FCC unit conversion can be quickly restored to profitable levels by using BCMT-500.

BCMT-500 enhances the AAI by delivering the proper balance of superior pre-cracking matrix, selective zeolite sites and excellent inherent metals tolerance. The matrix technology used in BCMT-500 selectively cracks the bottoms and works to protect the host catalyst from the deleterious effects of contaminant metals, thus helping to restore the catalytic performance of the entire inventory. BCMT-500 provides these benefits without adversely affecting the delta coke make on the FCC unit.

When to use BCMT-500

BCMT-500 can quickly be added to the inventory to enable a dramatic improvement in the profitability of the FCC unit by:

- Increasing the opportunity crude rate
- Increasing the residue fraction in the feed
- Decreasing the bottoms yield
- Decreasing the bottoms gravity
- Increasing the liquid product yield
- Improving the metals tolerance
- Increasing accessibility (AAI)
- Increasing the bottoms conversion

BCMT-500 commercial results

Figure 2 shows BCMT-500 being used to restore the bottoms upgrading power lost because a feed metals excursion laid down high levels of iron and sodium on the catalyst. As a result of the excursion, the bottoms yield increased to over 15 vol%. After applying BCMT-500, normal bottoms conversion was restored within a week and the bottoms yield stayed between 6 and 8 vol%.

A second example (Figure 3) concerns a refinery processing many opportunity crudes that needed BCMT-500 to improve the catalyst stability and bottoms cracking activity of a base alumina-sol catalyst manufactured by a competitor. At that time, strong diesel margins provided economic incentive for this refiner to maximize transportation fuel yield and quality. Typical fresh catalyst addition rates were 10–12 t/d. The feed is partially hydrotreated, but prevailing economics have increasingly favored the introduction of non-hydrotreated, high metals feedstocks. The power of BCMT-500 to upgrade the bottoms fraction is apparent from the large decrease in bottoms yield and gravity. The calculated overall annualized benefits are over \$25 million a year.

In a third example (Figure 4), BCMT-500 was used in an application processing low-sulfur atmospheric residue and mild hydrocarbon bottoms. The feed throughput was maximized by operating at low severity. By using BCMT-500, the bottoms conversion was markedly improved while the delta coke decreased slightly.

Typical product properties	
Additive name	BCMT-500
Application	Bottoms cracking and metals tolerance
Attrition index, wt%	3
Average bulk density, g/ml	0.74
Surface area, m ² /g	230
Particle size distribution (0-40), %	14
Particle size distribution (0-20), %	1

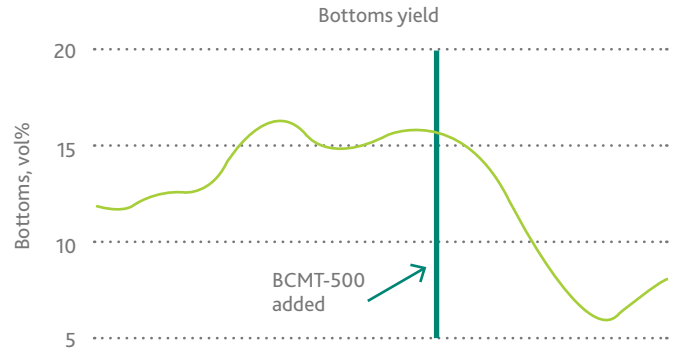


Figure 2: The bottoms yield fell rapidly in response to BCMT-500 additions

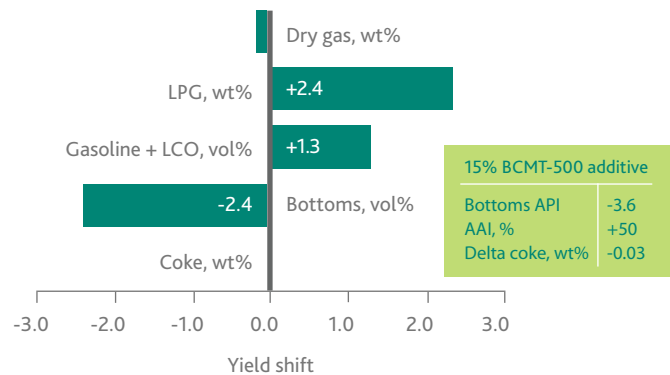


Figure 3: BCMT-500 increased the LPG and LCO yield while reducing the bottoms yield and the API gravity

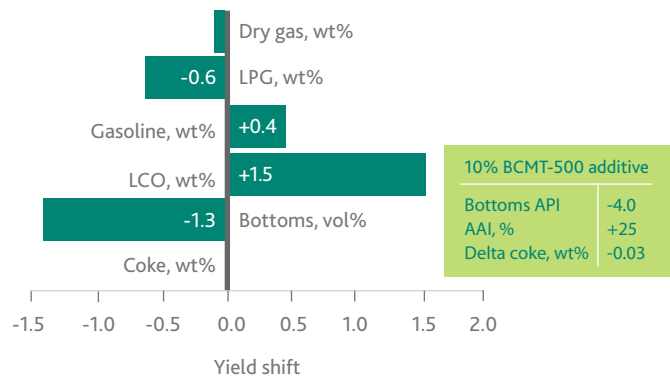


Figure 4: BCMT-500 increased the bottoms conversion

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