

Catalyst & Technology

October/November 2002

News

Criterion Catalysts & Technologies....

More Than a Hydrotreating Catalyst Supplier

You probably know us well as a hydrotreating and hydrocracking catalyst and technology supplier. Criterion Catalysts & Technologies (CC&T) has supplied a full range of high performance hydrotreating catalysts for over 50 years, and through our technology alliances, we offer the industry's premier processes for making the world's cleanest fuels. Because of the value they create for our customers, these technologies and our expert technical staff have helped us become the largest supplier of hydrotreating and hydrocracking products, processes and services - supplying solutions for every type of hydrotreating problem to refiners around the globe.

However, you may not know that Criterion also supplies catalysts, technical support and catalyst services for other key refining applications such as paraffin isomerization, alkylation feed pretreatment and naphtha reforming. Just as you've come to expect for your hydrotreating operations, you can count on us for leading performance catalysts, useful and timely technical advice and cost effective catalyst lifecycle services for the following applications.

C₅/C₆ Paraffin Isomerization

Criterion's capabilities and experience in C₅/C₆ paraffin isomerization are built on the original Hysomer catalyst and process developed by Shell researchers over 30 years ago. Today, we make the industry's most active and stable isomerization catalyst for non-chloride applications to ensure maximum, long-term octane-barrel production under the toughest conditions. Our Z-700A catalyst, developed by our affiliate Zeolyst International, gains its superior performance through the same unique, innovative zeolite technology that has made our hydrocracking catalysts the industry leaders. Commercial experience has proven that Z-700A

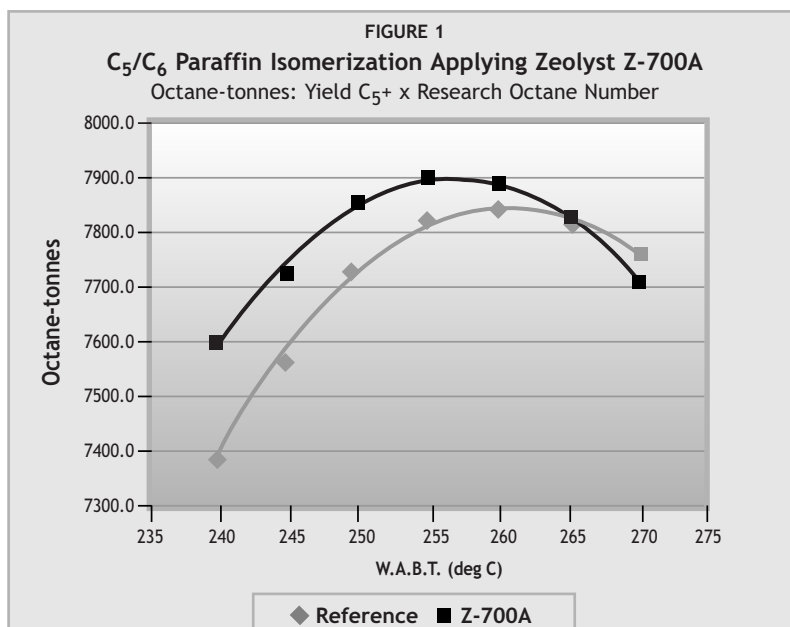
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will provide the following benefits versus other isomerization catalysts:

- Increased octane-barrels at the same operating conditions (*Figure 1*)
- Greater sulphur, water, CO and CO₂ resistance
- Lower deactivation when processing feed with high levels of benzene and C₇ paraffins
- Longer life
- Better regenerability (extending use and lowering lifecycle costs)



Alkylation Feed Pretreatment

CC&T offers a selection of catalysts, developed and manufactured by our affiliate CRI/Kataleuna, for the selective hydrogenation of C₃, C₄ and C₅ streams. These catalysts have proven to be the most effective and robust catalysts on the market for selective hydrogenation of alkadienes and acetylenes, providing high yields of the desired product for very long cycles. In the refinery, the key uses are for selective hydrogenation and isomerization of butene used for alkylation feed or direct blending in the gasoline pool and for selective hydrogenation of pyrolysis gasoline. These are our most widely used catalysts:

KL6656 CATALYST

Base metal catalyst used to pretreat alkylation feeds in units operating at low space velocity. Maximises yield of n-butene-2 and very resistive to common poisons. Also very effective for selective hydrogenation of pyrolysis gasoline. A possible lower cost alternative to noble metal selective hydrogenation catalysts for some units.

KL6660 CATALYST

Highest performance base metal catalyst for selective hydrogenation of cat-cracked gasoline.

KL7762 CATALYST

Noble metal catalyst used to pretreat alkylation feeds in units operating at high space velocity and/or with very limited heater capacity. Excellent for selective hydrogenation of butadiene in trickle phase and full hydrogenation of C₃/C₄ streams.

KL7763 CATALYST

Noble metal catalyst used for selective hydrogenation of pyrolysis gasoline.

KL7765 CATALYST

Catalyst with low noble metal content for selective hydrogenation of C₃/C₄ cuts, especially residual butadiene streams. Maximises isomerization of n-butene-1 to n-butene-2.

KL-7741D CATALYST

Catalyst with ultra-low noble metal content for selective hydrogenation of gaseous phase C₃/C₄ cuts.

Sulfur Guard Catalysts

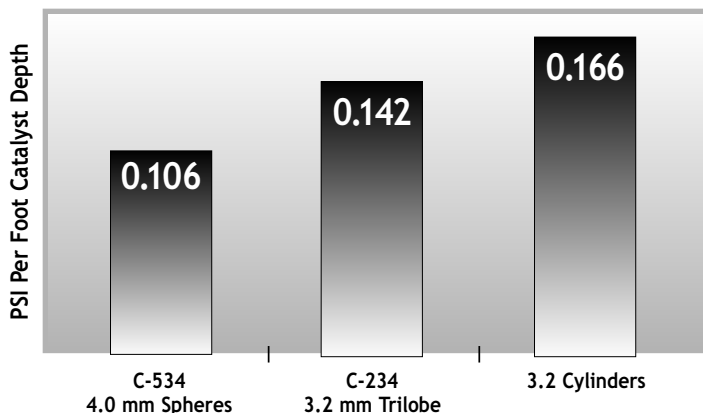
We provide catalysts, developed and manufactured by CRI/Kataleuna, that are used to protect expensive noble catalysts by removing residual sulphur from hydrocarbon streams. KL6512, a base metal catalyst, eliminates sulphur from the feed streams to reformers and isomerization units. Criterion can supply this catalyst in conjunction with one of its reforming catalysts to maximise the reformer's octane-barrel production. The catalyst is offered in the pre-reduced and stabilized form, so no special high temperature activation procedure is needed when starting up the process.

Tail Gas Treating

Criterion is the market leader in tail gas catalysts for SCOT®, Beavon® and similar reductive processes that treat the tail gas from Claus sulphur recovery units. The combination of our catalysts' outstanding performance and our in-depth technical know-how will ensure smooth, reliable performance for many years. Our C-534 and C-234 catalysts were designed to retain high conversions and low-pressure drop (*Figure 2*) to provide many years of trouble-free operation. They have demonstrated exceptional durability, achieving greater than 99.9% overall sulphur recovery with up to 10 years of continuous service. Both catalysts can be supplied in pre-sulphurized form to accelerate start-ups.

FIGURE 2

Tail Gas Catalysts / Actual Pressure Drop



Naphtha Reforming

We supply a variety of naphtha reforming catalysts for fixed bed (semi-regen and cyclic) and moving bed units. Criterion began manufacturing reforming catalysts for the extremely demanding cyclic-type reformers in the 1950's. Our unique manufacturing process enables us to make catalysts that have both high start-of-run C₅₊ yield and the best yield stability in the industry, which means they produce more octane-barrels per cycle than any other catalyst. Despite the long existence of reforming technology, we continue to achieve significant catalyst performance breakthroughs. Recent developments during the past 2 years have demonstrated C₅₊ yield gains of as much as 2 volume percent compared to our previous generation catalysts. These are our current key products.

PS-40

Our PS-40 reforming catalyst is designed to maximise C₅₊ yield and enable higher throughputs and/or higher octane production in continuous catalyst regeneration (CCR) reforming units. It incorporates the strengths of Criterion's earlier generation PS-10 and PS-20 catalysts, providing all-around excellent operability and the greatest amount of C₅₊ product. The alumina support for all these catalysts is designed to resist losses caused by abrasion and crushing, thereby minimising the addition rate for make-up catalyst. The support's design also reduces the rate of surface area decline (better activity maintenance) and improves chloride retention (reduced downstream corrosion and reduced chloride chemical costs). Additionally, improvements incorporated into PS-40's formulation have reduced the degree of paraffin cracking, which results in more hydrogen and C₅₊ reformat and less coke make. PS-40's capabilities make it particularly well suited for CCR reformers constrained by the quantity of coke that can be burned per hour in the regenerator. Since its introduction in 1998, PS-40 has established itself as the industry benchmark.

PR-11

Maximum yields within fixed bed reforming units are achieved by using a staged, synergistic system of catalysts to promote the desired reactions at the optimum reactor position. PR-11 is designed for the first and second reactors of the unit ("front end") where naphthene dehydrogenation is the desired reaction. This platinum/rhenium catalyst, developed by Criterion for coke stability and sulphur tolerance, also inhibits the undesired hydrogenolysis reaction (breaking of carbon-carbon bonds) that opens the naphthene rings and consumes hydrogen. The benefit to the refiner is a higher overall naphthene ring conversion to the preferred products - aromatics and hydrogen.

PR-9

This platinum/rhenium catalyst is designed for use in fixed bed reforming processes. When a staged catalyst system is utilized, this "back end" catalyst is often used in the third and fourth reactors with PR-11 in the first two reactors. PR-9 has been designed to reduce paraffin cracking, which is most likely to occur in the back end reactors. As a result, it preserves the hydrogen produced in the lead reactors and boosts the C₅+ yield.

PR-29

Criterion's PR-29 platinum/rhenium catalyst is also a "back end" catalyst used in fixed bed reforming processes. In addition to the reduced paraffin cracking advantage of PR-9, this skewed metal formulation (lower platinum, higher rhenium) promotes less dealkylation of aromatics. This provides the benefit of higher yields of C₈+ aromatics and reduces the formation of benzene.

As with all our application lines, outstanding catalyst performance is only half of the solution we provide to improve your reforming operations. Careful technical analysis and guidance built on years of experience in many different situations is the other half of the answer we provide to ensure you realize maximum benefits from our state-of-the-art catalysts.

Find The Best Solution With Just One Call

We are very thankful to be the supplier you depend on for answers to your hydrotreating problems, but please remember there are many other refining applications where Criterion may have the right solution for you.

*Please give our representatives
a call to find out if there is more
we can do for you.*



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