

Catalyst & Technology

December/January 2003

News

Criterion's products and technical know-how

Your Hydroprocessing Unit's Defensive Line

The worldwide trend of processing heavier crudes - plus the influx of crudes from Deep Water Gulf of Mexico, Mexico, South America, and synthetic crudes from Venezuela and Canada - has created new hydroprocessing catalyst contamination issues. Refiners must deal with these new problems to maintain the reliability of their hydroprocessing units.

The 2003 NPRA Technology Q & A hydroprocessing session highlighted concerns about the rising levels of arsenic and silicon contaminants in today's crude slates. Refiners already face challenges from the regulations mandating reduced sulfur in gasoline and diesel. Arsenic and silicon contaminants present an additional reliability challenge for future low sulfur solutions. Specifically, these contaminants can cause even greater economic penalties post Tier 2 and ULSD if left unchecked because of the resulting higher catalyst deactivation.

Arsenic: The silent catalyst deactivator

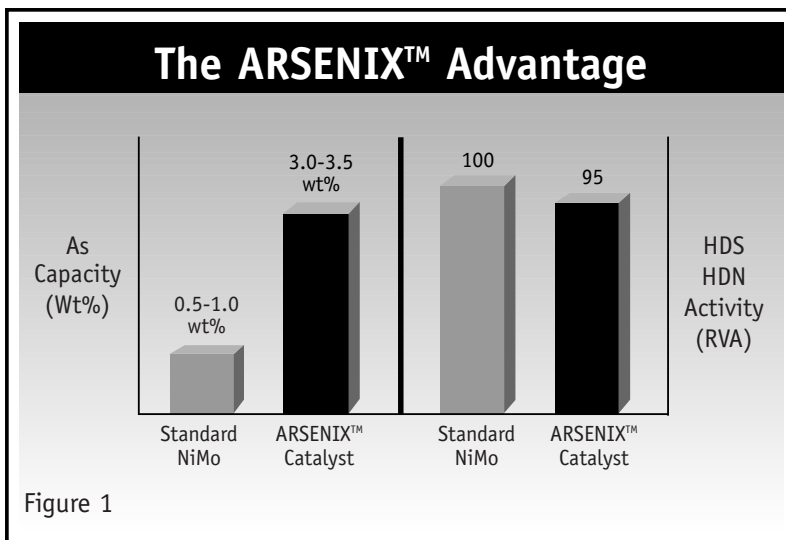
Arsenic levels as low as 0.2 weight percent on catalyst will render a catalyst inactive. At feed concentrations of 100 parts per billion, a typical hydroprocessing unit (1.5 LHSV) reaches this level in about a year - clearly, a very serious problem. The biggest difficulty a refiner faces with respect to arsenic is

detecting the problem before it causes excessive catalyst deactivation. The latest analytical methods now provide arsenic detection at levels as low as 20 parts per billion. Your Criterion representative can provide help with obtaining reliable testing to analyze arsenic in both light and heavy hydrocarbons.



CRITERION
CATALYSTS & TECHNOLOGIES

Knowing which crude sources contain arsenic and how to protect against this problem is essential for maintaining long-term, reliable clean fuels production. With its wide range of proven, innovative products and extensive know-how, Criterion can create an effective solution to combat this problem for each refinery situation. Criterion has responded to the growing arsenic presence by introducing an improved catalyst, ARSENIX™, to provide a more effective defense against this contaminant.



ARSENIX can typically adsorb more than 3 times the amount of arsenic of a conventional hydrotreating catalyst, while still maintaining similar desulfurization and denitrogen activity. This dual functionality means better arsenic uptake without sacrificing activity. The result? You minimize your potential economic loss due to downtime.

Silicon: An old problem. What's different now?

Historically, naphtha hydrotreaters that treated coker naphtha have been the key units that suffered from silicon contamination. The source of this problem has been coker antifoam additives. However, silicon is now being detected in the heavier hydrocarbon fractions, such as vacuum gas oil, at concentrations that can cause significant catalyst deactivation in FCC Pretreatment Units.

The sources for this new problem:

1. Silicon-containing flow improvers that are added at the crude pro-

duction site, especially in the case of the newer, heavy crude sources, and

2. New coker antifoam additives that shift the distribution of silicon into the heavier coker products.

When processing heavier feeds, the catalyst's silica capacity is controlled by the diffusion of the oil into the catalyst and rate of catalyst pore mouth plugging. These factors make catalyst pore size the most important variable influencing silica uptake capacity. This is

different from the naphtha silica capacity strategy where diffusion is generally not the issue and where catalyst surface

area is often the most important variable for silica capacity. (Figure 2)

Figure 2

**High Surface Area Silica Trap
(Same Catalyst in Both Services)**

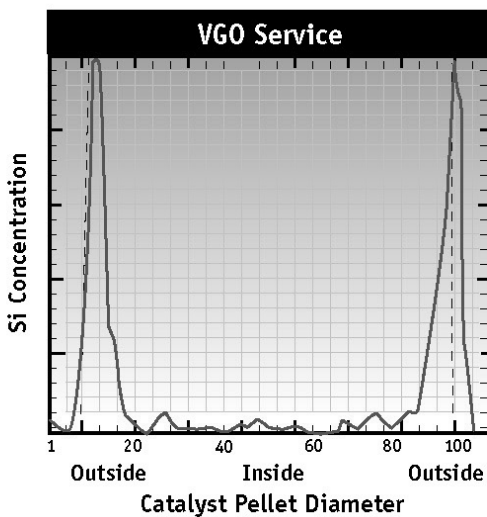
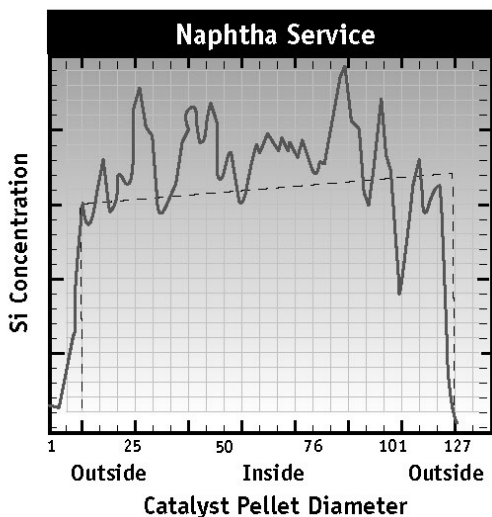
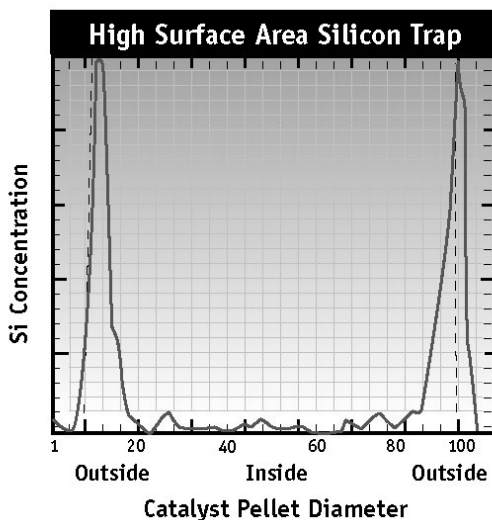
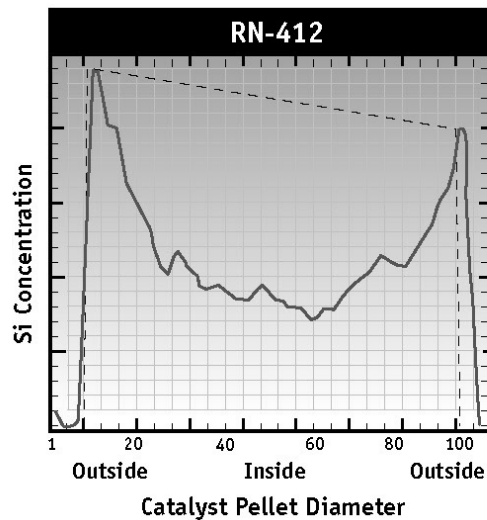


Figure 3

Problem



Criterion Solution



The solution for the VGO silicon problem is a specialty "wide" pore silicon trap, Criterion* RN 412 (Figure 3). Because of its pore structure design, silicon is able to penetrate further into the RN-412 catalyst pellet than typically observed with other hydrotreating catalysts. RN-412 has commercially demonstrated up to 3 times more silica uptake capacity than other silica-removal catalysts in FCC Pretreatment Unit service. As an added benefit, this specialty "wide" pore design is also very effective at removing other contaminant metals typically found in the VGO fraction.

Criterion's products and technical know-how can help you protect your high activity catalyst asset so that you can meet your clean fuels production goals.

Please contact your Criterion representative for more details.

* Trademark

Important:

All information contained in this document is considered accurate at the time of the testing, based on the equipment, and specific conditions and other limitations during the testing process. It is being furnished upon the express condition that the user will make its own assessment to determine the accuracy and applicability for the user's particular purpose.

Copyright Criterion Catalysts & Technologies, 2002



CRITERION
CATALYSTS & TECHNOLOGIES

Worldwide Offices:

HOUSTON:

16825 Northchase Dr; Suite 1000
Houston, Texas 77060-6029
Telephone: (281) 874-2600
Facsimile: (281) 874-2641

CANADA:

Suite 810, Centre 104
5241 Calgary Trail Southbound
Edmonton, Alberta T6H 5G8
Canada
Telephone: (1) 780-438-4188
Facsimile: (1) 780-438-3473

UNITED KINGDOM:

1650 Parkway
The Solent Business Park,
Whiteley, Fareham,
Hampshire, PO15 7AH
England
Telephone: (44) 1 489-881881
Facsimile: (44) 1 489-881882

SINGAPORE:

298 Tiong Bahru Road
#07-03 Central Plaza
Singapore 168730
Telephone: (65) 6276-3627
Facsimile: (65) 6276-7455

LUXEMBOURG:

Route de Longway, 420
L-4832 Rodange,
Luxembourg
G.D. of Luxembourg
Main Tel#: (352) 502-454
Catalyst Regeneration Services
Main Fax#: (352) 502-996

Visit us on the web: www.criterioncatalysts.com

e-mail address: publicaffairs@criterioncatalysts.com



CRITERION
CATALYSTS & TECHNOLOGIES