

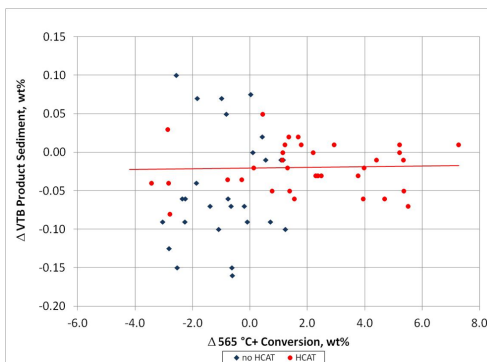
### Feedstock and Catalyst Screening for Ebullated-Bed Reactors

by Jim Lepinski

When ebullated-bed operators want to evaluate new catalysts or alternative feedstocks, they may consider screening in a Continuously Stirred Tank Reactor (CSTR) for comparative data. While that may be a relatively inexpensive option, wouldn't it be better to do the screening in a **real** ebullated-bed pilot plant where catalyst density, operating conditions, and process configuration more closely approximate the commercial reactor?

HTI has a very versatile ebullated-bed pilot plant facility at its R&D Center in Lawrenceville, NJ. This unit, originally built for the development of ebullated-bed residue upgrading technologies, has been continuously upgraded and renovated over the years. It boasts a throughput capability of 10-50 kg per day. It can operate with up to three reactor stages; with or without interstage separation; with inline hydrotreating if required; in other words, the HTI pilot plant can be configured to match our customer's process configuration. We have a full-capability petroleum lab for analyzing product samples (liquid & gas).

HTI provides testing and screening services for HCAT Technology licensees, as well as for catalyst producers and other (non-HCAT) ebullated-bed operators. We offer to screen feedstocks and catalysts in true blind tests.



### Slovnaft to Begin Using HCAT® This Spring

by: Dr. Brett Silverman

SLOVNAFT, a.s., a subsidiary of Central-European oil giant MOL, has committed to utilize the HCAT Technology in their Bratislava Refinery Residue Hydrocracking Unit (BRHCK). In late 2014, Slovnaft and HTI completed a commercial trial of HCAT at the Bratislava Refinery, which showed significant potential to increase reliability and profitability of the BRHCK Unit.

Slovnaft and HTI jointly developed the trial plan, including objectives and success criteria. The primary objective of the program was to slowly increase reactor temperature from a baseline starting condition (the normal operation mode), while monitoring product sediment and downstream equipment fouling. In summary, this HCAT trial showed that Slovnaft was able to successfully operate the BRHCK Unit at elevated reactor temperatures, which resulted in increasing the conversion of bottom-of-the-barrel residue by as much as +6W%. Despite this more severe operating condition, HCAT allowed Slovnaft to maintain an acceptable level of product sediment and reduced downstream heat exchanger fouling.

#### Highlights of the Slovnaft HCAT Trial:

With HCAT in use, Slovnaft operated the BRHCK Unit at residue conversion of +6W% above the starting baseline.

As shown in the graphic below/left, HCAT maintained stable levels of sediment in the atmospheric and vacuum tower bottoms, even at +6W% conversion.

The HCAT trial demonstrated a significant reduction in fouling within the most critical vacuum tower bottoms product heat exchangers (see chart below).

BRHCK Unit operations were stable at the elevated conversion levels.

The atmospheric tower, vacuum tower feed furnace, and vacuum tower did not show any increase in fouling while operating at elevated conversion.

Slovnaft may be able to increase conversion further than +6W% during subsequent optimization.

Heat Exchanger	Δ Cycle Length with HCAT @ WABT+6°C
HEX 1	5 x standard cycle length
HEX 2	No cleaning is expected during operation

