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New Applications for HCAT® Technology

New Year, New Perspectives

Light crudes, preferentially selected because of their ease of refining, have become more scarce over the past few years due to increased consumption and the fact that newer oil reservoirs tend to produce heavier rather than light crudes. Consequently, refining managers around the world have no choice but to find a way to process heavier vacuum residues such as Russian, Alaska North Slope, North Sea, Alberta Tar Sands, and other new crudes from the Gulf of Mexico.

A process that can deal with this constant change in crude viscosity is HTI's unique and proprietary dispersed-catalytic system, HCAT. This technology has been in commercial use for the past 3 years as an additive in ebullated bed upgraders. Its efficiency has allowed refiners to increase resid conversion with the same feed or enable the addition of lower-quality "opportunity" crudes while maintaining the same level of resid conversion.

The good news is that HCAT is not just for ebullated beds. HTI has conducted several standalone tests at its R&D Center on various vacuum resid feed-stocks and has demonstrated resid conversions as high as 80wt% with saleable product yields up to 70wt% as shown in the table below.

Experiments to determine the use of HCAT in cokers have also been conducted . HTI has projected residue conversion from a combined HCAT unit-delayed coker to be in excess of 90 wt%, based upon published coker correlations, and with projected C_4+ distillate yields in excess of 80wt%. This indicates that addition of an HCAT upgrader in front of an existing coker could significantly increase both liquid yield and overall residue conversion.

Standalone and Projected HCAT+ Coker Performance

Properties	Cold Lake/Athabasca	Black Rock VR	KMZ	Arab Medium
Feed				
Wt% 975°F+	86.60	95.26	82.23	
Wt% 1,000°F+				92..65
API+	1.2	1.4	3.0	6.5
Heptane insolubles, wt%	25.9	21.9	26.13	9.59
Toluene insolubles, wt%	0.19	0.08	0.04	0.01
MCR, wt%	22.7	26.55	25.41	17.21
Metals, wppm	618	538	845	182
Standalone Process Performance				
Hydrogen concentration scf/bbl	1371	1973	1605	1386
975/1,000°F+ concentration, wt%	79.66	82.77	75.16	80.74
Heptane insolubles, wt%	75.12	77.89	77.85	56.66
CCR, wt%	57.01	62.88	53.72	38.10
HDS, wt%	66.83	78.46	66.36	65.50
C_1-C_3 yield, wt%	5.30	7.20	6.86	6.35
C_4-975/1,000°F yield, wt%	74.26	71.43	69.48	73.07
Projected HCAT + Coker Performance				
C_4-975/1,000°F yield, wt%	85.71	85.33	82.75	84.73
975/1,000°F+, wt%	91.73	92.00	90.64	91.73
% coke reduction due to HCAT	59.92	70.36	57.30	50.10

HTI's World-class Pilot Plant

The HTI Research and Development Center in Lawrenceville, NJ houses a comprehensive set of tools for developing and evaluating heavy oil upgrading technologies .

The R&D center is equipped to handle early screening tests to full proof-of-concept. Its large pilot plant, a 30 bbl/day unit, is used to demonstrate process performance under near-commercial operating conditions including daily catalyst replacement, online distillation, close-coupled hydrotreating, and more.

The workhorses of our pilot plant are twin pilot-scale units, typically processing 0.3 barrels per day. These flexible units have multiple reactors that can be operated in ebullated bed, fixed bed, or slurry bubble column mode. They can also be operated as single or multi-stage units with or without interstage separation.

The R&D Center also houses smaller units, including multiple 1-liter batch autoclaves and continuous stirred tank reactors (CSTR), which can be easily configured to simulate different process conditions.

While the primary mission of HTI's pilot plant is development and commercial support of our HCAT technology, the R&D Center is also available for contract research programs. For more information visit us at:

http://hcat-hti.com/