



TK-605 BRIM™

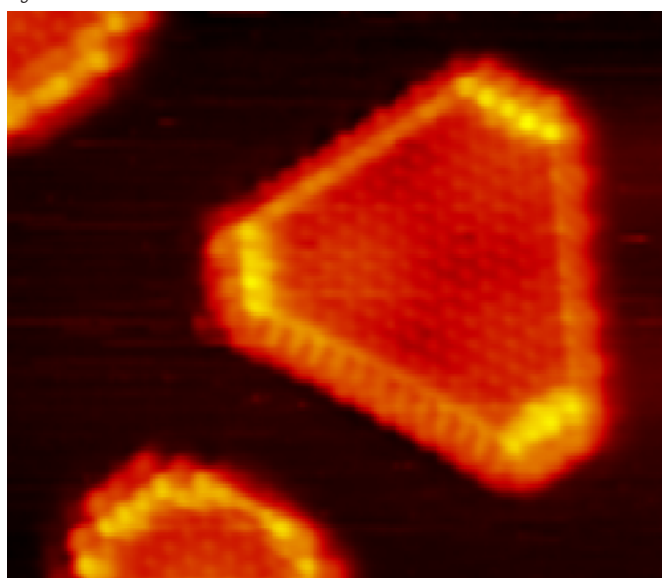
Haldor Topsøe expands its family of BRIM™ hydroprocessing catalysts by introducing a new hydrocracker pretreatment catalyst

Along with the other BRIM™ catalysts for FCC pretreatment and ULSD services, Haldor Topsøe has now introduced TK-605 BRIM™ a NiMo Catalyst optimised for high performance hydrocracker pretreatment services. This new catalyst is prepared with the BRIM™ Technology resulting in higher activity for both HDS and in particular HDN.

New research has shown that the key hydrogenation reaction sites are located at brim sites located on the top of the CoMoS clusters at the Mo-edge. Figure 1 shows Scanning Tunnelling Microscope pictures of two types of active phases that are present in our NiMo catalysts. The STM pictures show a top view of NiMoS slabs showing the brim sites (the bright yellow regions) in the active structures.

It is seen that the NiMo catalysts form the same hexagonal structures as in CoMo catalysts, but also some very small dodecagonal NiMoS clusters, where Ni is substituted at two different types of sites, indicating an even better dispersion of the active metals.

Figure 1



Using Haldor Topsøe's BRIM™ Technology we are able to increase the frequency and strength of both Type II activity sites and brim sites in both of these structures.

Hydrocracker pretreatment

The pretreatment stage in a hydrocracker is a fixed-bed catalytic process implemented with the primary objective of removing organic nitrogen and in particularly basic nitrogen compounds. Nitrogen compounds have a substantial negative impact on the activity of hydrocracking catalysts, and consequently on the performance of the hydrocracker.

The growing interest in processing heavy oils with high nitrogen content has created a need for pretreatment catalysts for both high-pressure hydrocrackers and mild hydrocrackers with higher hydrodenitrogenation (HDN) activity. TK-605 BRIM™ meets this need.

Performance of the new TK-605 BRIM™ catalyst

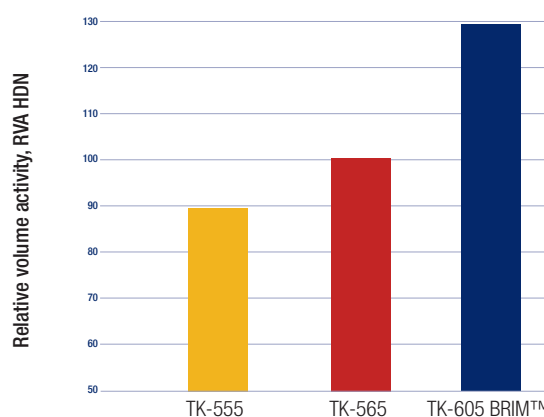
Haldor Topsøe is already a leading supplier of catalyst for demanding hydrotreating services. Topsøe has always emphasised the role of fundamental research in the development of hydrotreating catalysts, and recent scientific advances have given new opportunities for further technological developments.

Pilot plant tests of different feeds and operating conditions, have demonstrated that our new TK-605 BRIM™ exhibits a superior HDN activity of about 5°C (9°F) compared to our previous generation catalyst TK-565, as shown in Table 1 and Figure 2.

Table 1.
FEED CHARACTERISTICS AND OPERATING CONDITIONS IN TEST 1

The VGO/CGO feed blend characteristics		
Specific gravity / °API	0.9363 / 19.6	
Sulphur, wt%	2.03	
Nitrogen content, wt ppm	4276	
Basic Nitrogen, wt ppm	1417	
Distillation (10/50/FBP), °C / °F	336/637	
	418/784	
	533/991	
Total aromatics, (mono/di/tri+), wt%	37.2 (13.5/5.7/18.1)	
Operating parameters		
LHSV, hr-1	1.0	
Inlet pressure, kg/cm2g / psig	110 / 1617	
Inlet temperature, °C / °F	380 / 716	
Product properties	TK-565	TK-605 BRIM™
Specific gravity / °API	0.8893 / 27.6	0.8873 / 28.0
Nitrogen, wt ppm	267	117
Sulphur, wt ppm	87	50

Figure 2: Relative volume HDN activities from test 1.



Summary of pilot plant test results

As seen from the test results, both sulphur and nitrogen removal are significantly improved with TK-605 BRIM™ compared to TK-565. For HDN, the activity difference is between 30 and 35%, corresponding to 4-6°C (7-11°F) more activity.

Summary

Haldor Topsøe's new hydrocracker pretreatment catalyst TK-605 BRIM™ is based on our proprietary BRIM™ Technology. TK-605 BRIM™ exhibits a superior HDN activity, being about 5°C (9°F) more active compared to our previous generation hydrocracking pretreatment catalyst. TK-605 BRIM™ does not require a special start up procedure and Haldor Topsøe recommends in situ sulphiding to ensure the superior activity is obtained.



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