

*Welcome to Criterion's
World of Fixed Bed Residue
Hydrotreating*



CRITERION
CATALYSTS & TECHNOLOGIES

New Products for Resid Hydrotreating

Criterion Portfolio for Residue Hydroprocessing

The comprehensive portfolio of Criterion Catalyst and Technology Company for fixed bed residue hydroprocessing applications is shown in Table 1. These catalysts have specific functions and are normally referred to as Demetalisation (HDM), Transition (HDM and HDS), and Desulfurisation (HDS) catalysts, but they also perform the other hydrogenation reactions, and conversion of the 1000+ fraction of the residue.

Recent Additions to the Fixed Bed Resid (FBR) Catalyst Portfolio at Criterion:

RM-5030, RN-5210, and RN-5650 are the latest additions to Criterion’s portfolio for residue hydro-treating. These products will allow you to get the most from your residue hydrotreating operations.

Pilot Studies for New Products Development

The results shown in this document are from pilot plant studies designed to select the best new product to meet and exceed future needs in residue hydrotreating. Additional pilot and commercial data and results are available for consideration.

for a short time to complete the data set for kinetic analysis. The spent catalysts were analysed to determine the metals deposition capacity of every catalyst.

Table 2 lists Feedstock properties and operating conditions of the pilot plant studies conducted with these new catalysts.

The pilot plants were operated at three temperatures. The operation started at 371°C (700°F), and was then increased to 400°C (752°F). At the end of the test, the temperature was reduced to 385°C (725°F)

Heavy Residue Properties		Operating Conditions:	
Bachaquero long residue		LHSV, h-1	0.5
V, ppm	270	P, psig	1900 (13.1 Mpa)
Ni, ppm	30	H ₂ scf/b	3300
S, wt%	3.3		
MCR, wt%	11.4		

Table II. Pilot Plant Feedstock Properties and Operating Conditions.

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Table 1: Criterion Residue Catalysts

Criterion Residue Catalysts*				
	HDM	TRANSITION	HDS	CRACKING
New	RM-5030	RN-5210	RN-5650	
Recent		RN-412	RN-650	RN-5610
Base	RM-430	RN-410	RN-450	RN-440

Note*: The location on the X axis indicates the function of the catalyst. HDM towards the left and more hydrogenation towards the right. The cracking catalyst is a separate classification. The location on the Y axis indicates when the catalyst was commercialised.

Optimum Catalyst System for your application:

Criterion believes in designing optimum systems, in which the individual catalysts are the high quality building blocks. Designing such systems is based on Criterion's know-how, decades of commercial experience, pilot plant tests, and state of the art simulation programs. The optimum combination of these catalysts for your application depends on your needs and objectives. The addition of the new products and the availability within Criterion of a state of the art Fixed Bed Residue Simulator make possible the selection of the optimum system for your particular application. Thus, the performance and the value of the portfolio for fixed bed residue

catalysts that Criterion offers you have been significantly improved. These catalysts are in extensive use in fixed bed residue units all over the world, processing atmospheric or vacuum residue, whether the effluent is FCC feedstock, low sulphur fuel, or for additional feedstock to another conversion unit.

Please contact your Criterion Representative for more information on how you can benefit from using these products. Or contact Criterion through our general e-mail address at: public_affairs@criterioncatalysts.com.

New Catalysts

Upgrading the bottom of the barrel is one of the toughest challenges in hydrotreating due to the increasing heaviness of the feedstocks and the tougher requirements on product quality. Criterion Catalyst and Technology Company provides catalysts and technology solutions to help meet the current and the future requirements, while allowing refiners to maximise profitability.

Criterion has developed three new Residue Fixed Bed catalysts to help refiners maximise the performance and profitability in fixed bed residue hydrotreater operations. The main challenge in residue hydroprocessing is to meet product specifications with a reasonable catalyst life. Meeting this challenge requires catalysts that will resist deactivation by metals and coke at severe operating conditions. These new catalysts for residue hydrotreating are part of the tools and options available from Criterion to maximise the performance of your fixed bed residue hydrotreater.

RM-5030: High Metals Deposition HDM Catalyst

HDM catalysts are designed with very wide pores and macropores for storage of the removed metals.

RM-5030 is a catalyst with a very high pore volume (1.04 cc/g) and has very high capacity for metals deposition, while retaining high activity and stability for vanadium removal. This catalysts could hold more than it's own weight in metals.

RN-5210: High Activity Transition HDS Catalyst

Transition catalysts are designed for additional metals removal and hydrogenation for HDN and HDS.

RN-5210's HDS shows step out HDS activity for Vanadium on catalysts levels as high as 15wt%, making it very attractive for middle and back end reactors.

RN-5650: High Stability Tail End HDS Catalyst

Tail End catalysts have high hydrogenation activity and are designed for high temperatures and low H₂PP.

RN-5650 has significantly higher stability than its predecessors, which is essential for cycle length at severe operations.



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