

PROCESS DESCRIPTION:

CRITERION Residue Upgrading

The objectives of upgrading residue fractions are:

1. Reduction of metals (Ni + V), sulphur, Conradson carbon residue (CCR) and nitrogen for the production of low sulphur fuel oil and/or higher value feed stocks for heavy oil conversion units.
2. Conversion of the large 1000°F+ (538°C+) asphaltenic structures into lighter hydrocarbons (naphtha, distillate, and vacuum gas oil).

The feedstock processed in a residue hydrotreater is generally atmospheric tower bottoms, although sometimes vacuum tower bottoms or demetallised oils are processed. These feedstocks are characterized by having large, multi-ring aromatic molecules containing high levels of metals (V+Ni), sulphur, nitrogen and Conradson carbon residue (CCR).

Two routes exist for residue upgrading, carbon rejection and hydrogen addition. The hydrogen addition route is more expensive relative to carbon rejection but results in a significantly higher liquid yield. There are two major process designs for the hydrogen addition approach, ebullating bed and fixed bed. Typical operating conditions for fixed bed residue upgrading are:

H ₂ partial pressure	=	125-150 bar(1800-2200 psi)
LHSV	=	0.2-0.5 v/v/h
H ₂ /oil rate	=	420-600 Nm ³ /m ³ (2500-3500 SCF/bbl)

CRITERION offers catalyst systems for both ebullating bed and fixed bed units. To optimize overall fixed bed unit performance, CRITERION has designed catalysts with pore size distribution to match the changing molecular structure of the oil as it processes through the reactor system. The RM-5030 catalyst is designed for high metal uptake capacity and moderate sulphur conversion. They are applied in the front end reactor when processing high metal containing feedstocks (>70 ppm V). The RN-5210 and RN-412 catalysts exhibit moderate metals uptake capacity but higher activity for sulphur and CCR conversion. These catalysts are applied in front end reactors when processing feedstocks with metal content below 70 ppm V or in middle reactors when processing high metals containing feedstocks. The RN-650, RN-450 and RN-5610 catalysts exhibit the highest activity for sulphur, CCR, and nitrogen conversion. These catalysts are to be applied in the middle and/or tail end reactors. The RN-5610 catalyst is designed for tail-end reactor application and for vacuum residue processing.

ADDITIONAL INFORMATION

All catalyst information supplied by CRITERION is considered accurate but is furnished with the express understanding that the customer receiving such information shall make its own assessments to determine suitability of such information for customer's particular purpose. All purchases of catalyst from CRITERION are subject to CRITERION's standard terms and conditions of sale (including CRITERION's product warranties) set forth in a sales proposal, sales contract, order acknowledgement, and/or bill of lading.

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