

Technology Profile

Overview The LCN CDHydro catalytic distillation technology processes FCC gasoline streams from refineries to produce a stream that is essentially free of mercaptans. The treated LCN stream, when reblended with desulfurized HCN will increase RON by as much as 0.5. The LCN CDHydro process is one of a family of process technologies developed and commercialized by Catalytic Distillation Technologies (CDTECH) for license to the petroleum refining and petrochemical industries. CDTECH is a partnership between Lummus Technology, a CB&I company, and Chemical Research & Licensing, a CRI company.

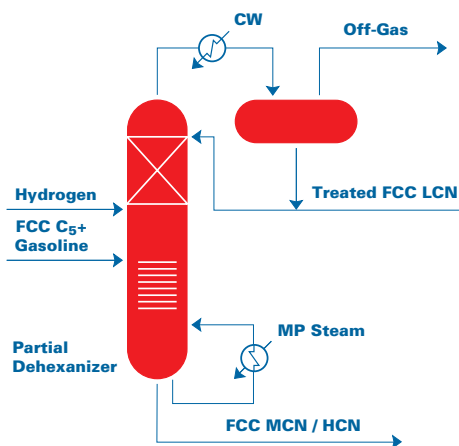
LCN Treatment Selective, full range FCC gasoline sulfur reduction begins with fractionation of the light naphtha overhead in a LCN CDHydro column. Mercaptan sulfur reacts with diolefins to produce heavier sulfur compounds which exit in the tower bottoms. The distillate product (LCN) is essentially mercaptan-sulfur-free. The remaining diolefins are partially saturated to olefins by reaction with hydrogen. In addition, alpha olefins are hydroisomerized to beta olefins. The beta olefins have higher octane, resulting in a RON improvement of as much as 0.5 in the reblended desulfurized full range gasoline. Bottoms from the LCN CDHydro column, containing the reacted mercaptans, are fed to a separate hydrodesulfurization unit.

Selective hydrogenation is a required pretreatment step for TAME production and C₅ alkylation, improving product quality in both, and reducing acid consumption in the latter. The process uses commercially available catalyst in catalytic distillation structures. The washing action of the reflux minimizes oligomer formation, flushes heavy compounds from the catalyst and promotes long catalyst life.

The unique catalytic distillation column combines reaction and fractionation in a single unit operation. This constant pressure boiling system assures precise temperature control in the catalyst zone. Low reaction temperature and isothermal operation enhances selectivity and minimizes yield losses to paraffins.

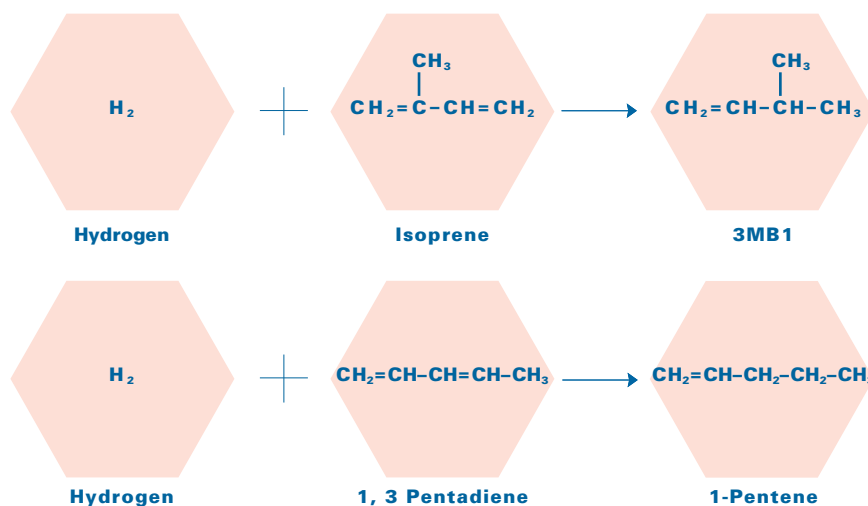
Capital costs are considerably lower than conventional hydrotreaters since the single column design eliminates costs associated with fixed-bed systems. Additionally, the ability to remove acidic sulfur compounds eliminates the need for sweetening.

LCN CDHydro Process Flow Diagram

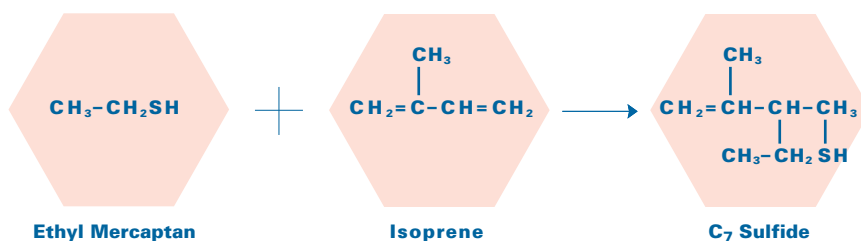
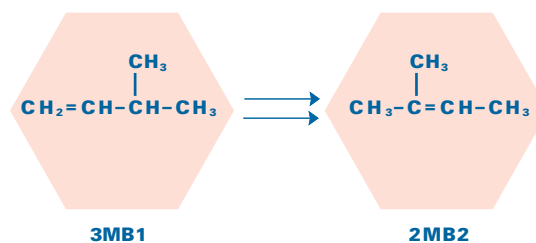


Process Chemistry

Selective Hydrogenation



Isomerization



Advantages

C₅ CDHydro process offers:

- Low operating pressure
- Low operating cost
- High product yield (low paraffin make)
- No polymer recycle across catalyst
- No sweetening required
- Essentially mercaptan-sulfur-free distillate product
- Retrofit to existing C₅ columns
- All carbon steel construction
- Isomerization improves feedstock quality
- No hydrogen compressor

CDTECH's catalytic distillation offers:

- Isothermal operation
- High conversion
- Low capital cost
- Low utilities
- Long catalyst life with sustained high conversion
- Reduced plot area

Typical Overall Material Balance

Feeds	LB/HR	
Catalytic naphtha	763,000	(70,000 BPD)
Hydrogen (100 % basis)	135	(1.0 MMSCFD)
Products		
Light cat naphtha	272,000	(28,000 BPD)
Heavy cat naphtha	491,000	(52,000 BPD)
Off-gas	7000	(zero if PSA hydrogen used)

Typical LCN Product Composition

(will depend on feed composition and client requirements)

Residual C ₅ Diolefins	< 1000 ppm
Mercaptan Sulfur	< 1 ppm
RON boost in rebleded desulfurized full range naphtha	0.5

CDTECH

3010 Briarpark Drive
Houston, TX 77042 USA
Tel: 713-821-5181
Fax: 713-821-3587