

Refining Industry Hydrotreater/HDS Unit

Process Gas Chromatograph Application Note

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Hydrotreating is the process of catalytically reacting a stream with hydrogen to chemically stabilize and remove undesired chemicals. Stabilization involves the conversion of unsaturated hydrocarbons to saturated hydrocarbons, and the chemicals that are removed include sulfur, nitrogen, oxygen, halides, and metals. The removal of harmful chemicals is important because these chemicals would poison the reactions of other refining processes. If the process is used specifically for sulfur removal, it is called hydrodesulphurization or HDS.

The feed is mixed with hydrogen gas and preheated to the appropriate reactor inlet temperature. The stream enters the top of a fixed-bed reactor where it reacts with the help of a catalyst. The products flow to a separator where it is split into hydrogen-rich gas and oil-rich liquid. Part of the hydrogen-rich

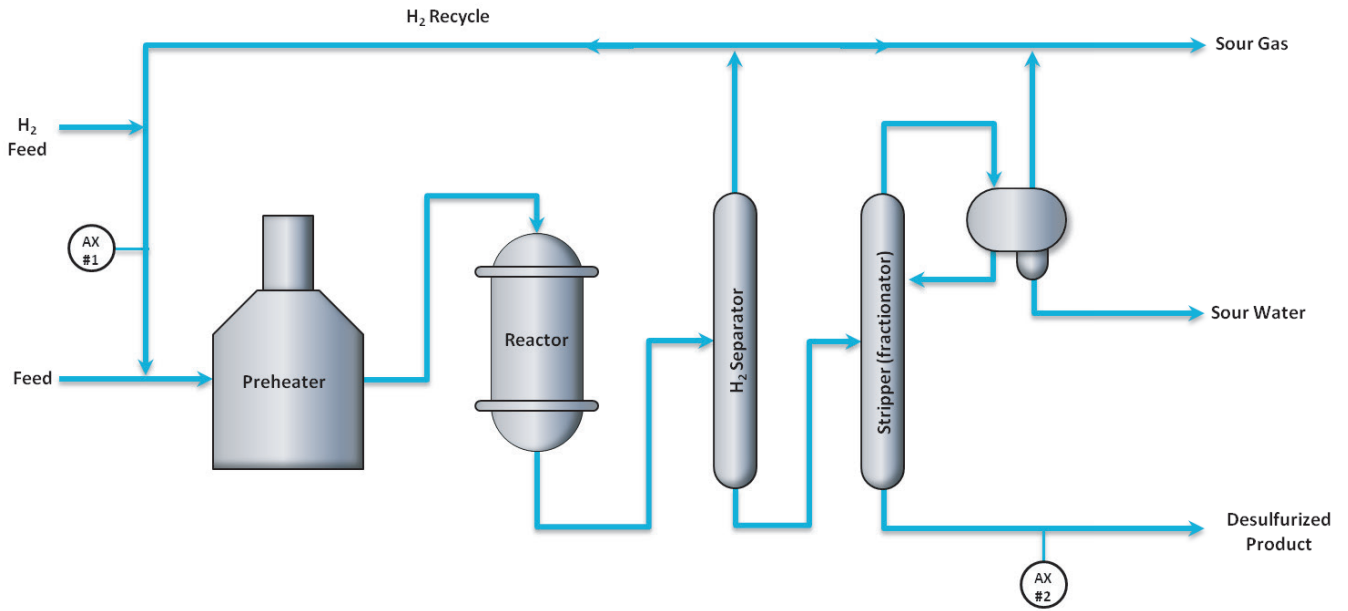
gas is recycled, and the remainder leaves as sour gas. The oil-rich liquid is sent to a stripper (fractionator), where the bottoms product is the desired desulfurized oil stream. The overhead is partially condensed and sent off as either sour gas or sour water.

Typical GC Measurements

There are typically two locations the process gas chromatograph is used in Hydrotreating:

- 1. Hydrogen Recycle** – monitors the impurities in the stream to ensure there is proper separation.
- 2. Desulfurized Product** – measures propane to minimize the amount of propane and lighter products in the stream.

Hydrotreater/HDS Unit



| Analyzer No. | Stream | Components Measured | Measurement Objective |
|--------------|----------------------|---|--|
| 1 | Hydrogen Recycle | N ₂ , O ₂ , CO, CO ₂ , C ₁ – C ₃ + | Monitor the impurities in the Hydrogen recycle stream |
| 2 | Desulfurized Product | C ₃ | Minimize the C ₃ and lighter components in the product stream |

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