

Refining Industry Vapor Recovery Unit (VRU)

Process Gas Chromatograph Application Note

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In the Vapor Recovery Unit the recovery and separation of olefins is accomplished in a series of fractionation towers. Since the VRU is the prime source of olefins for the alkylation unit, it is very important that all the olefins be recovered.

Leaving the main fractionator, the heavier components of the light gases liquefy, and the stream flows through a liquid-vapor separator. The vapor is sent to the bottom of the primary absorber and will travel up the absorber, and the liquid is sent to the top of the primary absorber and will travel down the absorber. This action creates better separation of olefins and lighter hydrocarbons.

The overhead product of the primary absorber is sent to a secondary absorber. Light hydrocarbon gases rise through the secondary absorber and exit as fuel gas. Sponge oil is passed down the absorber to remove heavier components from the light hydrocarbon fuel gas. The heavier components are recycled back to the main fractionator.

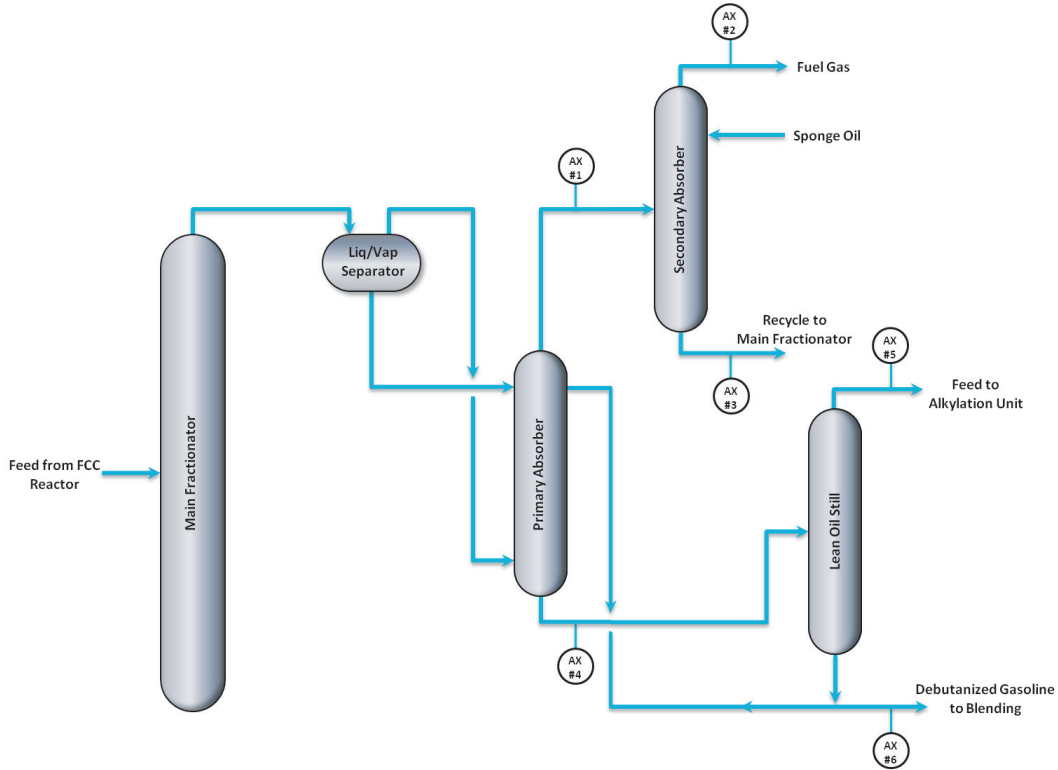
The bottoms product of the primary absorber is passed to a lean oil still, where olefins are separated from debutanized gasoline to be fed to an alkylation unit. The debutanized gasoline stream is directed either back to the primary absorber for recycle or on to blending.

Typical GC Measurements

GC's are placed around the absorber towers for optimum separation and production of fuel gas and olefins:

- 1. Primary Absorber Overhead** – measures $C_{3=}$ and $C_{4=}$ to minimize the loss of olefins.
- 2. Refinery Fuel Gas** – measures $C_{2=}$ and $C_{3=}$ to minimize the loss of olefins.
- 3. Secondary Absorber Bottoms** – monitors C_4 and $C_{4=}$ to minimize recycling of light hydrocarbons.
- 4. Primary Absorber Bottoms** – measures light hydrocarbons to limit the amount of light hydrocarbons entering the feed to the alkylation unit.
- 5. Lean Oil Still Overhead** – measures light hydrocarbons to limit the amount of light hydrocarbons entering the feed to the alkylation unit.
- 6. Lean Oil Still Bottoms** – monitors C_4 content in the gasoline due to RVP specifications.

Vapor Recovery Unit (VRU)



Analyzer No.	Stream	Components Measured	Measurement Objective
1	Primary Absorber Overhead	C ₃ =, C ₄ =	Minimize losses of Olefins
2	Refinery Fuel Gas	C ₂ =, C ₃ =	Minimize losses of Olefins
3	Secondary Absorber Bottoms	C ₄ 's	Minimize recycling of light hydrocarbons
4	Primary Absorber Bottoms	C ₂ , C ₃ , C ₄	Minimize light hydrocarbons in the feed to the Alkylation Unit
5	Lean Oil Still Overhead	C ₂ , iC ₄	Minimize impurities in the feed to the Alkylation Unit
6	Lean Oil Still Bottoms	iC ₄ , nC ₄	Monitor C ₄ content in the blended gasoline due to RVP specifications

For more information please contact:

5980 West Sam Houston Parkway North
Suite 500
Houston, TX 77041
713-939-7400
ProcessAnalyticsSales.industry@siemens.com

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100 Technology Drive,
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1-800-964-4114
info.us@siemens.com

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