REFINING & GAS PROCESSING

UOP Merox™ Process for Mercaptan Extraction with nViro MET™

Environmentally robust, cost-effective solution for sulfur extraction

Introduction
In response to growing demand for low sulfur products, UOP continues to innovate and improve its Merox process. These improvements help reduce capital investment, improve operability, and help to efficiently and economically achieve ever-tightening sulfur specifications while maintaining strict environmental compliance.

The Merox process is used to extract low molecular weight mercaptan sulfur species and remove $\text{H}_2\text{S}$, $\text{CO}_2$, and $\text{COS}$ from gas, LPG, pentanes, straight run naphtha, cracked naphtha and condensate streams. The treated product stream is suitable for:

- Direct feed to downstream upgrading processes such as alkylation and isomerization processes.
- Downstream petrochemical use
- Commercial pipeline transport

Technology Delivery

Merox technology can be delivered through a basic engineering design package, or by engineered, modular supply to reduce project schedule, risk and on-site construction requirements, as is the nViro MET package.

Process Description

Feed containing $\text{H}_2\text{S}$, $\text{COS}$, and $\text{CO}_2$ is treated in a prewash chamber to remove these contaminants. This prevents permanently spending the caustic used for mercaptan extraction. Contaminant-free hydrocarbon feed enters the bottom tray of a multi-stage extraction column, and flows upward through the trays where it contacts caustic flowing counter-current downward through the extractor. High-efficiency trays maximize the contact between the hydrocarbon and caustic phases, reducing the amount of caustic and minimizing the number of trays required for extraction. Treated, low-sulfur product passes through a coalescer, exits the extraction column and flows to storage, pipeline or further processing.

FEATURES & BENEFITS

High Efficiency Design
Extraction of all sulfur species is accomplished in a single vessel, minimizing plot space and equipment cost. High-efficiency extractor trays facilitate very low caustic ($\text{NaOH}$) circulation rates. This reduces or eliminates the potential wash oil use while also minimizing re-entry sulfur in the treated product for maximum value as well as reducing vessel size and cost.

Complete Effluent Treatment

By combining the Callidus nViro MET package with the Merox process, customers can reduce COD, BOD and TOC in excess of 99%, converting contaminants to $\text{H}_2\text{O}$ and $\text{CO}_2$, to minimize or eliminate additional waste water treatment. This is all done on-site with a reduced footprint compared to other spent caustic treatment processes.

Product Quality

Merox units are designed to achieve desired product specifications for downstream alkylation, oligomerization, and isomerization process units as well as ultra-low sulfur specifications (<5 wt ppm total sulfur) for high purity applications.
Rich caustic, containing sodium mercaptides, is sent to the regeneration section. Air and a small quantity of Merox WS-2 catalyst are injected into the rich caustic stream where mercaptides are oxidized to form disulfides in the oxidizer. Disulfides, mostly insoluble in caustic, are separated and removed from the regenerated caustic in the disulfide separator. Fully regenerated caustic solution is recycled back to the extraction section. Spent caustic, disulfide oil, and spent air are processed by the nViro MET. The nViro MET treats both liquid and gaseous waste streams using ultra high thermal destruction. The resulting combustion product is quenched and scrubbed to meet most requirements. Tailored solutions are available to remove remaining effluent impurities resulting in the ability to meet the most stringent air and water permits.

MVP Regeneration
Caustic regeneration section features a minimum number of vessels for oxidation, disulfide removal and scrubbing of the spent air stream. Benefits over a standard regeneration section include:
- 90% reduction in product re-entry sulfur
- 99% reduction of sulfur in the spent air stream
- 25% reduction in plot area requirements

Merox MVP Regeneration is exclusively supplied as an equipment package. Merox MVP is available as an option for new Merox units and it is also ideal as a retrofit for an existing Merox unit, enhancing the ability to achieve ultra-low sulfur and environmental specifications in a compact and cost-effective manner.

Catalyst
UOP manufactures highly active and selective catalysts for the Merox process to ensure consistent quality. The UOP Merox WS-2 catalyst is a water-soluble, specially-formulated catalyst that is used for mercaptan extraction.

Experience
- >900 extraction units and >7,100,000 BPSD placed on stream
- >65 Merox units have been designed and delivered as modular equipment supply
- Operating units from 350-90,000 BPSD

This level of operating experience, along with continuous innovation to reduce costs, improve operability, achieve ever-tightening sulfur specifications, and meet air and water emissions makes the UOP Merox process the technology of choice for the treatment of hydrocarbons streams.

For more information
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