



Sweet Solutions.™



MERICHEM COMPANY



LO-CAT[®] II PROCESS FOR H₂S OXIDATION AND SULFUR RECOVERY

Lubrizol's facility in LeHarve, France produces a lube oil additive via a batch reaction that uses elemental sulfur as a reactant and produces H₂S as a byproduct. Lubrizol selected Merichem's LO-CAT[®] II Hydrogen Sulfide Oxidation Process to sweeten H₂S emissions and recover sulfur.

The LO-CAT II system was chosen for its ability to handle the process variation in H₂S concentration. During the 8-hour batch reaction cycle, H₂S concentrations in the effluent gas range from 0 to approximately 100 percent. The cyclic rate of H₂S entering the LO-CAT unit translates to a maximum instantaneous H₂S rate of 10 tons/day (T/D), with average daily H₂S loading equivalent of just 3 T/D.

The LO-CAT II Oxidation System produces good quality elemental sulfur, which is recycled as feed stock to the batch reactors. During each cycle, approximately 3,000 kg of sulfur is produced and recycled from the LO-CAT II unit and directed back to the batch processes. The sulfur is 99+% pure and less than 200 ppm (wt.) ash.

The LO-CAT system has performed its dual processes effectively since startup in June 1996, handling a turndown requirement that few other H₂S removal processes can tolerate and saving Lubrizol money by recycling elemental sulfur. H₂S emissions were reduced from 820,000 ppmv to less than 10 ppmv.

LO-CAT[®] II PROCESS

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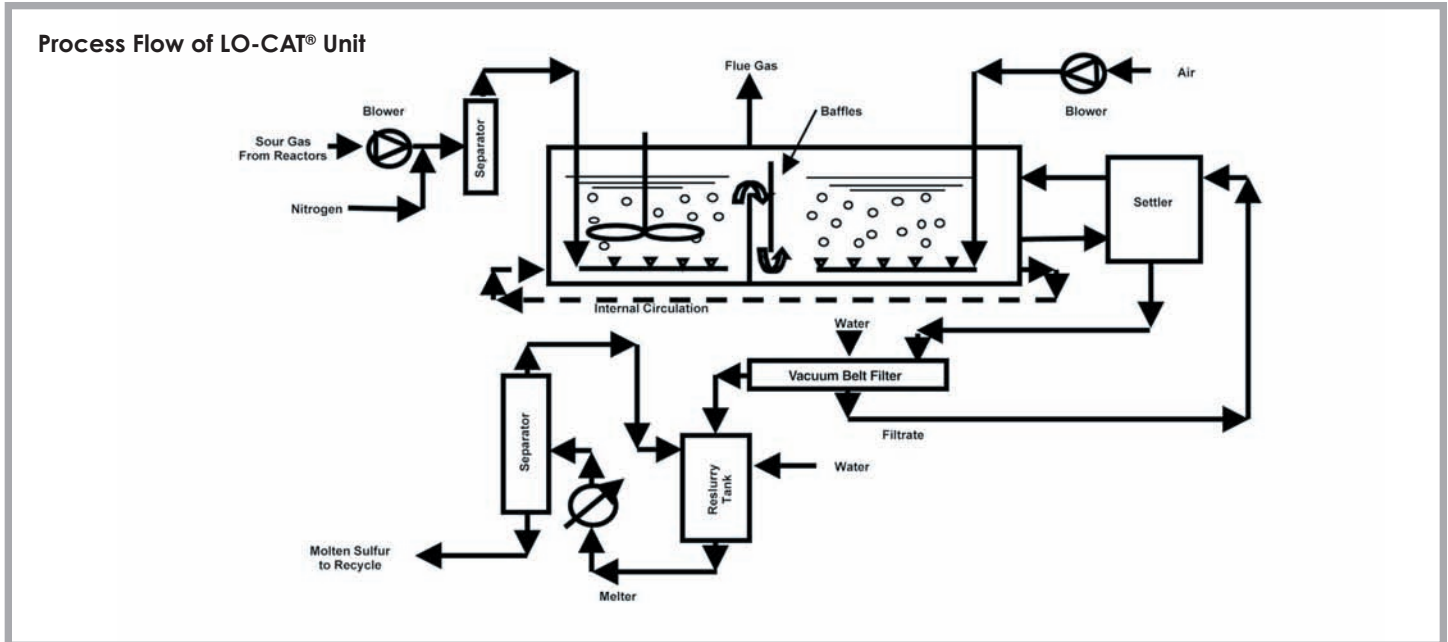
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In this custom-designed LO-CAT[®] II process, sour gas from the batch reactors is compressed, then sent through an inlet knockout pot to remove any liquid droplets. The gas is then sparged into the regenerated LO-CAT solution in the absorber sections of the autocirculation vessel. Rotary lobe air blowers supply air that is sparged through the reduced LO-CAT solution in the oxidizer sections of the autocirculation vessel, which circulates the iron catalyst throughout the autocirculation vessel. (Both the H₂S oxidation to sulfur and the regeneration of the iron catalyst occur in one vessel.)

A small slipstream of the resulting solution is pumped to a sulfur settler vessel, where it is concentrated into a slurry of approximately 10 wt% of sulfur. Progressive cavity pumps then deliver the slurry to a vacuum belt filter that produces a sulfur cake of approximately 60 wt%. After a water wash, the filter cake is transferred to a re-slurry tank, where water is added to produce a 10 wt% sulfur slurry. The sulfur slurry is pumped from the re-slurry tank into the melter, a patented, vertical shell and tube exchanger. The molten sulfur then flows to a separator, where the sulfur settles to the bottom and water rises to the top, and the sulfur is recycled back to the batch reactors.

In the LO-CAT process, H₂S is converted to elemental sulfur by an environmentally safe, chelated iron catalyst. The chelated iron oxidizes the sulfide ions to

elemental sulfur by means of a redox reaction in which the iron is reduced from the ferric state to the ferrous state and then is regenerated back to the ferric state by reacting with oxygen (air).