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MERICHEM COMPANY



LO-CAT[®] II PROCESS

HYDROGEN SULFIDE REMOVAL FROM SOUR ASSOCIATED GAS

In November of 1999, PT Pertamina (Indonesia's state-run oil company) installed the LO-CAT[®] II Hydrogen Sulfide Oxidation Process for their Mudi Field in East Java, Indonesia. The oil production operation at the Mudi field was producing up to 11 MMSCFD of sour associated gas. This associated gas was to be used to strip additional H₂S from the sour crude and to generate power in 3 gas fired turbines.

Pertamina investigated several alternative sulfur recovery options, evaluating each in accordance with the following criteria:

- Gas capacity turndown requirement = 3:1
- H₂S concentration turndown requirement = 3:1
- H₂S in effluent gas ≤ 10 ppmv (removal efficiency = 99.9+%)
- Minimal operator attention

- Produce a sulfur product suitable for agricultural use
- Proven reliable process

The investigation led to the selection of the LO-CAT[®] II Hydrogen Sulfide Oxidation Process, designed and manufactured by Merichem located in Schaumburg, Illinois, USA

Pertamina's custom built LO-CAT II unit was designed to remove 15 long tons per day (LT/D) of sulfur by treating 11 MMSCFD of sour associated gas, at 60 psig, containing 3.62 vol% H₂S.

The sour associated gas is directed to a coalescing filter, which removes liquid and aerosol hydrocarbons, prior to entering the liquid full absorber of the LO-CAT II

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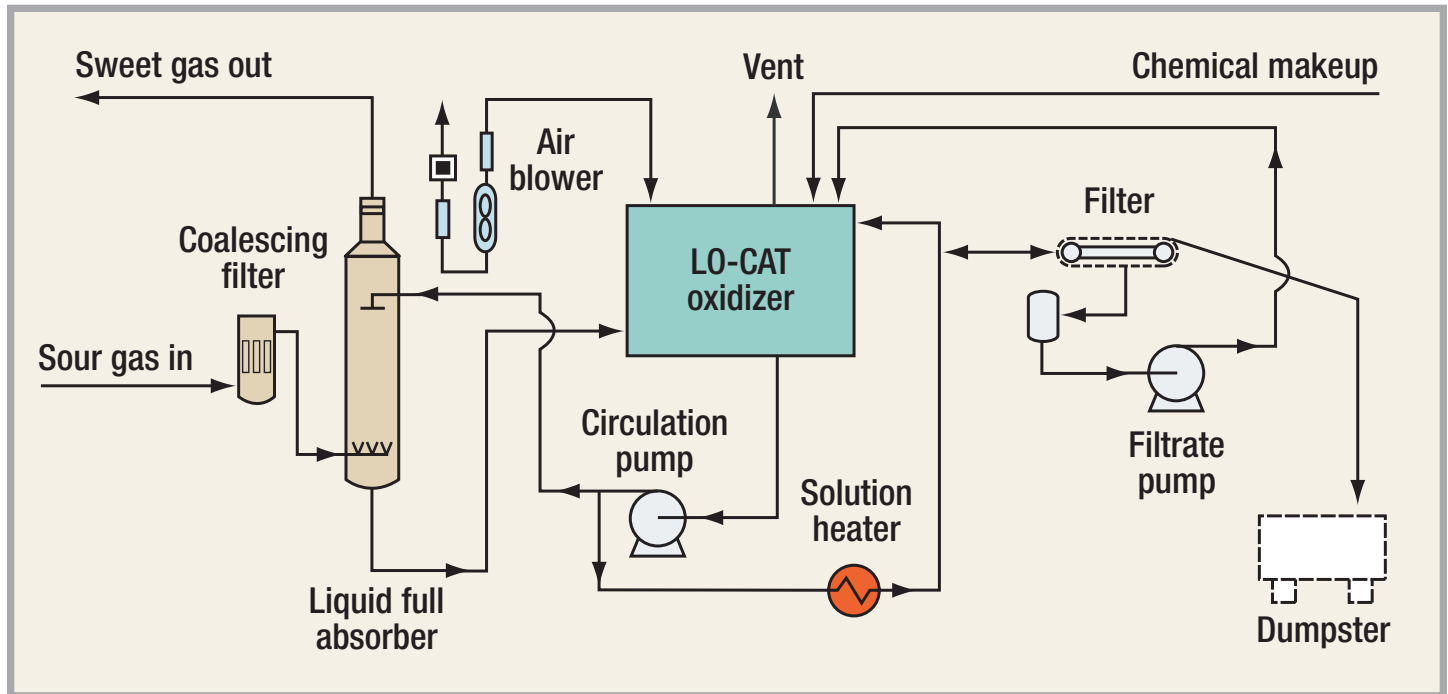
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Pertamina LO-CAT Unit—Process Flow Diagram

unit. Inside the liquid full absorber, the gas flows upward through the vessel, contacting counter-currently the circulating LO-CAT II solution. As the gas passes through the liquid full absorber, the H_2S is absorbed into the LO-CAT II solution and converted to elemental sulfur. The sweet gas exits the top of the liquid full absorber, passes through a mist eliminator and an outlet knockout pot for removal of entrained liquid droplets, and then enters the refinery fuel gas system.

The catalyst solution is removed at the bottom of the liquid full absorber vessel and is directed to the oxidizer for regeneration. In the oxidizer, air is sparged uniformly through the solution, converting the iron back to the Fe^{+++} state. The oxidizer consists of a vessel containing air spargers and a series of baffles and weirs. The air lift in combination with air injection, baffles and weirs creates an "air-lift" which promotes circulation of the catalyst within the oxidizer vessel. The regenerated solution is then pumped back to the liquid full absorber.

Sulfur is removed from the unit by pumping a small slipstream of the circulating catalyst solution to a settling vessel. In the settler, the sulfur particles are concentrated by gravity from approximately 0.2% by weight in the circulating solution to approximately 10% by weight in the bottom of the settler. The concentrated sulfur slurry is pumped to a vacuum-

belt filter, which produces a filter cake containing approximately 60% sulfur by weight. The filtrate is returned to the unit. The sulfur is currently being disposed of at a local landfill.

Pertamina's LO-CAT II unit has produced treated gas with a H_2S content significantly below the required outlet level of 10 ppmv. The treated gas is currently used to strip additional H_2S from the sour crude and to generate power in 3 gas fired turbines. Operator attention is less than 2 hours per day.