Sweet Solutions.™

MERICHEM COMPANY

LO-CAT® PROCESS
AS A CLAUS TAILGAS CLEANUP UNIT

In 1997, Western Gas Resources selected the LO-CAT® process to treat the amine acid gas generated in their Pinnacle Gas Processing plant located in Tennessee Colony, TX. When the facility's processing demand exceeded the LO-CAT capacity (2 LTPD of sulfur), Western Gas installed another LO-CAT unit having a capacity of 7 LTPD. In the summer of 2000, Western Gas once again forecasted that future processing requirements would dramatically exceed the sulfur removal capacities of both LO-CAT units combined. Western Gas met this challenge by installing an acid gas enrichment unit, a 40 LTPD, 2 stage Claus unit and a hydrolysis unit. The effluent gas from the hydrolysis unit was then directed to the 7 LTPD LO-CAT unit.

In this scheme, sour natural gas is initially processed in an MDEA amine unit which produces an acid gas stream having 4 to 5% H_2S. The acid gas is then furthered processed in an acid gas enrichment unit, which is simply an additional MDEA unit. The rich acid gas from this unit contains 20 to 30% H_2S, while the lean acid gas stream contains 5 to 1,000 ppm H_2S. The rich stream is directed to the Claus unit and the lean stream is directed to an incinerator.

The Claus unit converts approximately 95% of the H_2S in the rich acid gas stream to elemental sulfur while converting a small portion of the H_2S to COS, SO_2 and CS_2. The effluent gas from the Claus unit is then processed in the hydrolysis unit, which converts the COS, CS_2, and SO_2 to H_2S.

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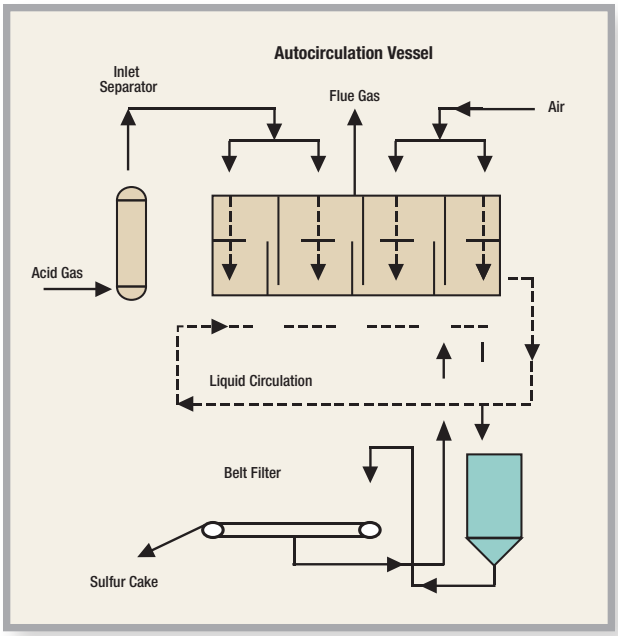
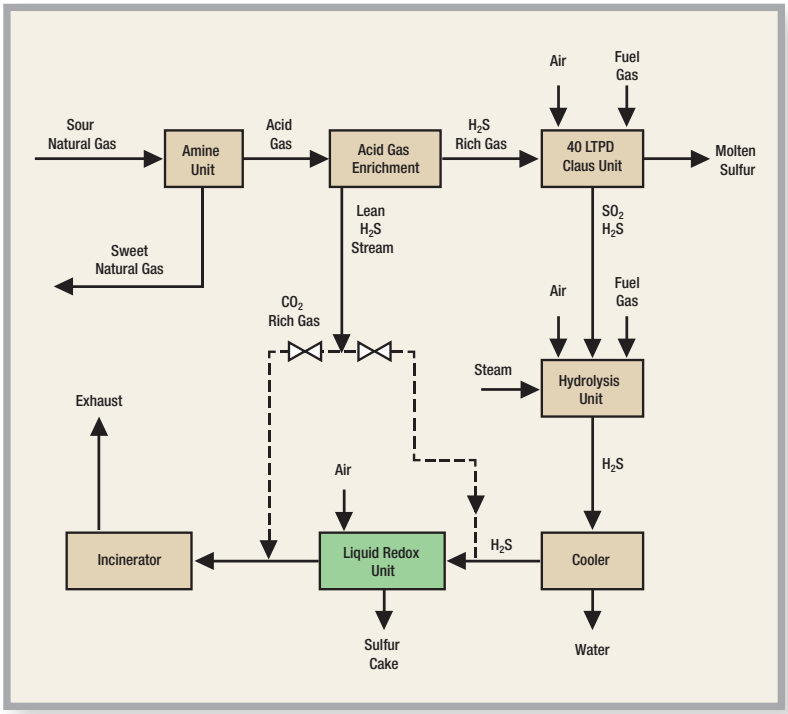


Autocirculation Liquid Redox SRU



Sour Gas Processing Train

The effluent from the hydrolysis unit, which is essentially all CO_2 and H_2S is cooled in a direct-contact water cooler followed by an air cooler. The cooled gas is then processed in the 7 LTPD LO-CAT unit, which removes 99.99+% of the H_2S.

Because of permit requirements, the flue gas from the LO-CAT unit consisting of air and CO_2 with a few ppm of H_2S is directed to an incinerator. In reality, the flue gas could be exhausted directly to atmosphere without exceeding the sulfur emission requirement or creating odor problems.

While operating with the LO-CAT unit as a tail gas treater, the efficiency of the Claus/hydrolysis/LO-CAT processing train exceeded 99.99% while the overall plant efficiency ranged between 97% and 98%. This reduction in removal efficiency was due to the H_2S contained in the lean acid gas from the acid gas enrichment unit, which was sent directly to the plant incinerator.

While operating in the tail gas treating mode, the chemical cost associated with the LO-CAT unit was $62 per ton of sulfur produced in the LO-CAT unit.

After approximately 6 months of operation, the total sulfur load to the Claus unit was less than 7 LTPD. At this low rate (approximately 82% turndown), the Claus unit was very difficult to operate. Consequently, it was shutdown along with the acid gas enrichment and hydrolysis units, and the acid gas from the first MDEA unit was processed directly in the LO-CAT unit. In this processing mode, the overall H_2S removal efficiency was still greater than 99.99%.

By utilizing LO-CAT as a tail gas treater, the Anadarko facility not only achieved removal efficiencies exceeding 99.99% but also a turndown ratio of 100%.