Catalysts and Technology Licensing
A case study

ExxonMobil

FLEXSORB™ SE Plus solvent helps natural gas processor achieve stable operations

Energy lives here™

Challenge:

Natural gas gathered from different reservoirs can create unique processing challenges for treatment facilities. Wide compositional variations between wells can significantly impact processing requirements. In addition, gas streams with high carbon dioxide to hydrogen sulfide ratios (CO_2-to-H_2S) are particularly problematic to a facility from design and operational perspectives.

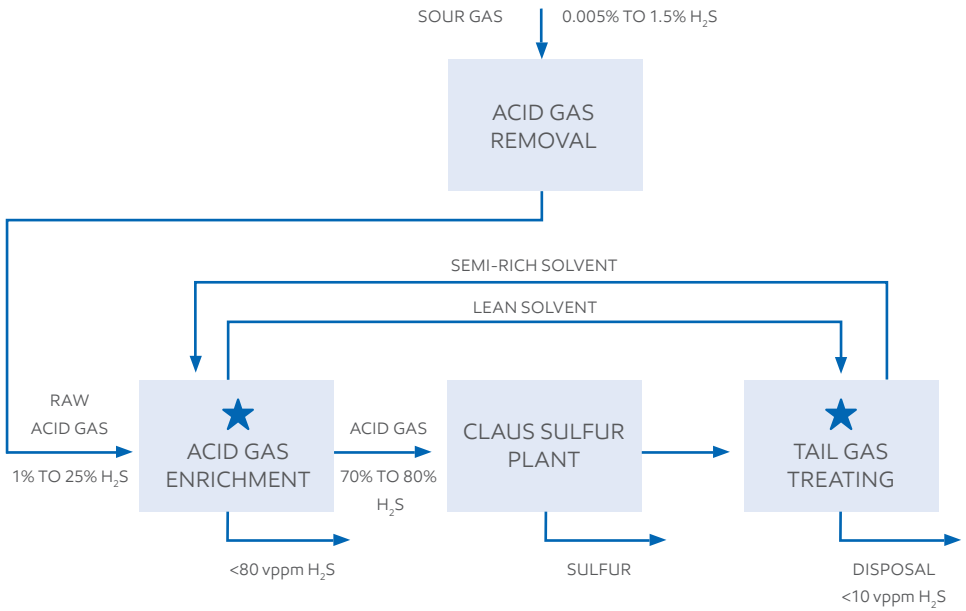
This scenario was faced by a U.S. facility treating gas streams drawn from several formations. The raw natural gas contained H_2S that varied from 0.005 to 1.5 mole percent (mol%), with CO_2 remaining constant at 3.5 mol%. After initial treatment by the primary acid gas removal (AGR) unit, the raw acid gas was expected to contain 1 to 25 mol% H_2S with co-absorbed hydrocarbons – a poor quality feed for a Claus-type sulfur recovery unit (SRU). The acid gas concentration must be kept above 20% H_2S to operate reaction furnaces without supplemental fuel firing or oxygen enrichment, which are more costly.

The facility needed an economical and reliable design to address the unfavorable and variable acid gas composition. The design stipulates the facility was to achieve an overall sulfur recovery efficiency of greater than 99.86%. The gas from the tail gas treating (TGT) unit must also contain less than 10 vppm H_2S to meet local regulations for sulfur dioxide (SO_2) emissions.

Solution:

ExxonMobil proposed an integrated acid gas enrichment (AGE) and TGT design coupled with FLEXSORB™ SE Plus solvent to meet the facility's objectives. FLEXSORB SE Plus solvent uses proprietary sterically hindered amines to selectively remove H_2S in the presence of CO_2. The acid gas is fed to the AGE absorber, where it is contacted with lean solvent from the common AGE/TGT regenerator and with semi-rich (partially loaded) solvent from the TGT absorbers.

As a result, the AGE unit was able to produce a CO_2-rich stream containing less than 80 vppm H_2S and an acid gas feed containing 70 to 80 mol% H_2S with essentially no hydrocarbons. The acid gas from the AGE is then fed to the SRU where H_2S is converted to elemental sulfur. The tail gas from the SRU is then treated with a lean slip stream of FLEXSORB SE Plus solvent from the common AGE/TGT regenerator to less than 10 vppm H_2S.



★ **Uses Flexsorb™ SE Plus solvent**

Result:

The integrated design using FLEXSORB™ SE Plus solvent has performed flawlessly since startup, exceeding the 99.86% sulfur recovery efficiency requirement while reducing equipment costs and solvent circulation rates. The innovative design enables the facility to achieve stable natural gas production despite varying feed compositions. Acid gas enrichment with FLEXSORB SE Plus solvent is the key to the unit's flexibility, producing consistently high-quality acid gas feeds to the conventional Claus plants. As an added benefit, the unit also rejects the hydrocarbons in the raw acid gas, resulting in high plant reliability and extended Claus catalyst life.

Exceeds sulfur recovery efficiency targets

Enriched sub-quality acid gas for stable and reliable plant operations

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