Increasing Amine System H2S and CO2 Recovery

REFCOMM

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Highly Qualified Process / Project Engineers
Engineering Services Based on First-Principles
Petroleum Refining, Petrochemical, & Complex Chemical Processes
Reliable Process Solutions
Very Large Inventory of High-Quality Process Equipment
(HX, Chillers, Cooling Towers, Generators, etc.)
Service Centers Throughout the USA
Qualified Service Technicians
Round-The-Clock Service
Project Documentation
Client Staff Training
ACID GAS REMOVAL USING AMINES

Figure 1 Amine System

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ACID GAS REMOVAL - ISSUES

H₂S is lethal at very low ambient concentrations

H₂S is generated in hydrotreaters, hydrocrackers, and catalytic reformers and exists in many natural gases

H₂S removal from refinery fuel gas is an extremely important part of refining operations (environmental regulations). CLAUS PROCESS:

\[
\begin{align*}
2\text{H}_2\text{S} + 3\text{O}_2 & \rightarrow 2\text{SO}_2 + 2\text{H}_2\text{O} \\
2\text{H}_2\text{S} + \text{SO}_2 & \rightarrow 3\text{S} + 2\text{H}_2\text{O}
\end{align*}
\]

Solvents include MEA, DEA, MDEA, and DIPA

Scrubber – Regenerator system, solvent recirculation

Regenerated solvent cooled by Feed / Effluent HX plus air and / or water cooler

Lean amine temperature determined by HX design and ambient / CW temperature
ACID GAS REMOVAL - ISSUES

Poor scrubbing and regenerator efficiency caused by:
  Fouling of column internals
  Fouling of reboiler

Excessive foaming in amine solution causes:
  Amines in regenerator drum
  Condenser corrosion
  Amines in sweetened gas

Fouling of lean amine lines and cooling equipment:
  Increased lean amine temperature to scrubber ->
  Reduced acid gas removal efficiency
ACID GAS REMOVAL - ISSUES

PROBLEMS:
Increased acid gas loading
Reduced acid gas removal efficiency

NORMAL SOLUTION:
Try to increase amine circulation rate

HOWEVER:
Scrubber / Regenerator already close to maximum loading

RESULT:
Cut upstream unit throughput \rightarrow huge economic losses
FACT:
Reducing lean amine temperature to scrubber is crucially important
This restores acid gas removal efficiency

AGGREKO SOLUTION:
Provide supplemental cooling of lean amine stream

METHODOLOGY:
Insert highly efficient Aggreko HX in recirculating loop
Aggreko’s methodology requires no unit shutdown; causes no disturbance
Aggreko cooling towers or refrigerated chillers provide supplemental cooling

RESULT:
Throughput and efficiency restored  economic losses averted
“Aggreko Whitepaper - Increasing Amine System H2S and CO2 Recovery Efficiency”
QUESTIONS?