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SR² SULFUR REMOVAL AND RECOVERY PROCESS TECHNOLOGY



GTI is a leading research, development, and training organization addressing global energy and environmental challenges. We're applying energy and aerospace experience to lower energy costs and provide cleaner sources of fuel and power.

SR² SULFUR REMOVAL AND RECOVERY PROCESS TECHNOLOGY

Offering advantages in capital and operating costs, and footprint for sulfur removal and recovery

SR² is an integrated multi-contaminant removal process that incorporates acid gas removal, sulfur recovery, and tail gas treating in one step. The process is applicable for sulfur removal and recovery from natural gas, refinery acid gas treatment, and syngas. As a process that addresses multi-contaminants, SR² has the potential to significantly reduce the complexity and costs of current clean-up trains. Preliminary process performance and economics suggest a 40% cost savings compared to competing technologies and a 32% reduction in operating expenditures.

SR² is ideal for syngas desulfurization at 285 to 300°F, at any given pressure (higher the better) and offers a tighter integration with the process for removal of trace contaminants and heavy metals. In syngas applications, an absorbing column removes chlorides and ammonia

as well as trace heavy metals (mercury, selenium, arsenic, and cadmium). Hydrogen sulfide in the syngas, together with injected sulfur dioxide, dissolves in a solvent containing a homogeneous liquid catalyst. The Claus reaction is carried out in the liquid phase where liquid sulfur is the reaction product. Given the density difference between liquid sulfur and the solvent, the sulfur readily separates and does not limit the equilibrium extent of the reaction as occurs in gas phase Claus systems.

SR² can also provide flexibility during expansion at existing gas plants. The simple system can treat the high-pressure natural gas stream, the amine-, or the Claus-tail gas streams to debottleneck existing systems. Sulfur dioxide can be purchased over the fence or produced on-site from the recovered elemental sulfur.

STATUS: Scaling-up the SR² process requires a field demonstration to validate long-duration reliability, operability, and capital costs. SR² is ready for pilot plant testing that will treat tonnage levels of H₂S—either treating the raw natural gas stream, thereby replacing acid gas removal, sulfur recovery, and tail gas treating processes in one step—or treating a tail gas stream from one of the existing units. GTI is looking for a commercial partner and host site for pilot-scale demonstration.

KEY FEATURES

- Comprehensive sulfur removal
- Flexible process for sweetening natural gas
- SR² can directly handle CO₂-rich streams of natural gas or of amine stripper off-gas
- Can compete with liquid redox and Claus processes over a very wide range of sulfur capacities

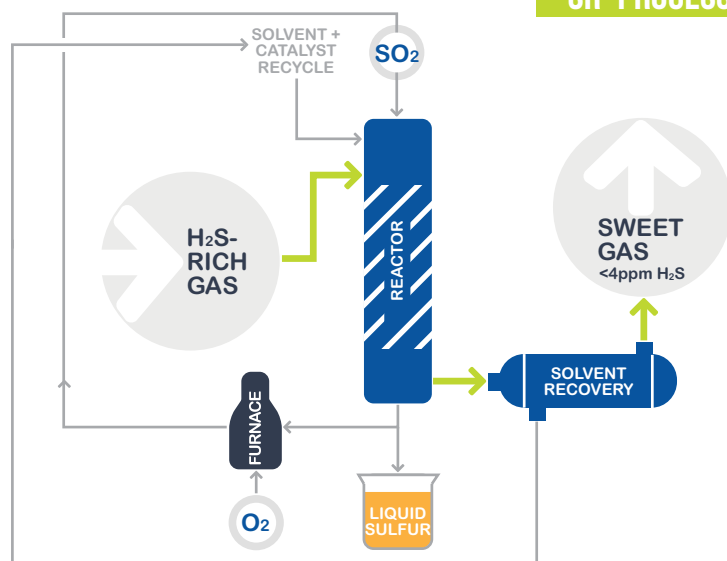
APPLICATIONS

- High-pressure natural gas treating (sulfur removal/recovery)
- Amine or Claus stripper off-gas (Claus/SCOT replacement)
- GTL, gasification, or refinery syngas clean-up

BENEFITS

- Reduces capital expenses
- Significant economic advantage, with cost benefits greatest in high-pressure systems
- Provides flexibility during expansion at existing gas plants

SR² PROCESS DIAGRAM



2-21

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