

APPLICATIONS

The Shell Claus Off-gas Treating (SCOT) process has been developed to remove sulfur compounds from Claus tail gas to comply with stringent air emissions regulations. The conventional SCOT process is able to easily meet less than 250 ppmv total sulfur in the SCOT offgas, which corresponds to an overall sulfur recovery efficiency of 99.9% on intake. The Low Temperature (LT)-SCOT has the same recovery capabilities, but it reduces the total installed cost (TIC) by 15% compared to the conventional SCOT unit. LT-SCOT will save utility cost when compared to regular SCOT.

DESCRIPTION

The LT-SCOT process essentially consists of a reduction section and an ADIP absorption section with a special hydrogenation catalyst. The Claus tail gas feed to the LT-SCOT is heated to 220°C (compared to 280°C - 300°C for a regular SCOT). This lower temperature allows the use of a HP (40 barg, 600 psig) steam heater which eliminates risk of catalyst fouling by mis-operation of the burner which is used in the regular SCOT, therewith drastically improving the reliability of the LT-SCOT reduction section.

The heated gases then flow through a catalyst bed where sulfur compounds, including CS₂ and COS, are reduced to H₂S. The gas from the reactor is cooled by direct contact cooling with water to 40°C. Water vapor in the process gas is condensed, and the condensate is sent to a sour water stripper. The cooled gas is counter-currently washed with an alkanolamine solvent in an absorption column designed to absorb almost all H₂S but relatively little CO₂. The treated gas from the absorption column contains only traces of H₂S and is oxidized in a standard Claus incinerator. Concentrated H₂S is recovered from the rich solvent in a conventional stripper and is recycled to the Claus unit. The LT-SCOT units are designed for minimum pressure drop so that they can be easily added to existing Claus units. If insufficient pressure is available, a gas booster can be installed, preferably between the cooling tower and the absorption tower.

INTEGRATION OF LT-SCOT

Integration with the amine treater upstream the Claus plant can lead to considerable equipment savings. The add-on SCOT in the figure has a complete independent solvent system.

UTILITIES

Typical utility consumption of an LT-SCOT unit for a 100 t/d sulfur intake to preceding Claus plant. Basis: 71 vol.% H₂S and 11% NH₃ content in Claus feed gas.

4 bar(g) steam consumption	t/h	3.0	(for add-on SCOT)
40 bar(g) steam	t/h	0.4	
Electricity	kW	70	(for integrated SCOT)
Electricity	kW	95	(for add-on SCOT)

LICENSOR

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For any information:

Mr. Frank Scheel
Tel: +31 71 582 7366
E-mail: frank.scheel@jacobs.com

Mr. Dennis Koscielnik
Tel: +1 403 692 2950
E-mail: dennis.koscielnik@jacobs.com

www.jacobs.com/comprimo

FEATURES

- » Steam reheater instead of fuel gas burner
- » Lower Total Installed Cost compared to regular SCOT
- » Lower utility consumption compared to regular SCOT
- » High degree of desulfurization over a wide range of operating conditions
- » Recovery of sulfur via the Claus unit
- » Minimum operator attention
- » Easy integration with existing Claus units
- » High reliability - less than 1% unscheduled shutdown time



LT-SCOT Unit

REFERENCES

For LT-SCOT 24 units have been designed, of which eight are in operation. Newly designed units will all feature the LT-SCOT process, as it differs from regular SCOT units only in the catalyst operation temperature.

