APPLICATIONS
The Claus process has been developed to recover elemental sulfur from H2S containing gases originating from gas treating plants such as alkanolamine units or physical solvent plants. Modern Claus plants should be able to process H2S/NH3 containing gases as well, originating from Sour Water Stripper.

DESCRIPTION
The Claus process is based on the combustion of part of the H2S to SO2 and the subsequent reaction between the remaining H2S and the SO2 produced, forming sulfur. There are two main varieties of the Claus process: straight through and split flow. The straight through process is used for feed gas containing more than 50% H2S while split flow is applied for gases containing 50 to 15% H2S. The sulfur recovery process consists of a thermal stage (combustion chamber, waste heat boiler) and two or three catalytic reaction stages (reheater, reactor and condenser). In the thermal stage, the Claus reaction takes place at a high temperature level (950-1350°C). The sulfur produced in this stage is condensed either in the waste heat boiler or in the condenser. Subsequently, the gas is reheated to a temperature of 200-300°C before introduction into each reactor stage. The heat generated from the reactions is used for steam production. In the thermal stage, a choice can be made between the production of LP, MP or HP steam. In the sulfur condensers LP steam is generated. The tail gas is sent to an incinerator or tail gas treater.

OPERATING CONDITIONS
NH3 in the total Claus feed gas can be processed up to 30 vol.%. Some feed gases may contain small amounts of heavy hydrocarbons and aromatics, operating experience up to 2 vol.%. Claus plants can be designed for turndown ratios of 100-15%. Product sulfur has a purity of more than 99.9% -bright yellow-; and contains less than 10 ppmwt H2S after degassing. H2S (stack) emission: 5-10 ppm vol. exit thermal incinerator depending on the incinerator temperature and 10 ppm vol. exit a catalytic incinerator.

UTILITIES
Basis: 100 t/d 2 Claus reactors, 71 vol.% H2S and 11 vol.% NH3 feed gas and thermal incineration with heat recovery, sulfur recovery 96%.

<table>
<thead>
<tr>
<th></th>
<th>Consumption</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 bar(g) steam</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>40 bar(g) steam</td>
<td>–</td>
<td>12.7</td>
</tr>
<tr>
<td>Pre-/Reheat 40 bar(g)</td>
<td>1.0</td>
<td>–</td>
</tr>
<tr>
<td>Electricity</td>
<td>265</td>
<td>–</td>
</tr>
<tr>
<td>Fuel gas</td>
<td>0.23</td>
<td>–</td>
</tr>
<tr>
<td>Boiler feed water</td>
<td>16.5</td>
<td>–</td>
</tr>
<tr>
<td>Steam for plant heating</td>
<td>0.9</td>
<td>–</td>
</tr>
</tbody>
</table>

REFERENCES
Since 1957 more than 550 Claus units have been built throughout the world, ranging in capacity from 3 t/d up to 1,200 t/d. Sulfur recovery and gas sweetening projects are handled by a specialized project group with many years of experience. Feed back of operating experience and results of plant tests are utilized for continuous optimization of Jacobs’ sulfur recovery process.

FEATURES
» Sulfur recovery with:
  - two reactors : up to 96%
  - three reactors : up to 98%
» NH3 destruction
» Integrated sulfur degassing process
» Energy saving through heat integration and waste heat recovery
» High turndown
» High reliability - less than 1% unscheduled shutdown time
» Explosion proof equipment
» Good accessibility to all equipment
» Jacobs has facilities to manufacture, construct and assemble packaged units. Skid mounted and module mounted units have been supplied ranging from 3 to 440 t/d

LICENSOR
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