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(54) Title: A PROCESS FOR THE HIGH RECOVERY EFFICIENCY OF SULFUR FROM AN ACID GAS STREAM

(57) Abstract: A process for the recovery of sulfur from an acid gas stream is disclosed. The process includes a Claus sulfur recovery step in combination with a biological sulfur recovery step to provide a sweet gas stream having very low concentrations of hydrogen sulfide and sulfur dioxide. The process includes reacting an acid gas stream with oxygen under such oxidation conditions to yield a combustion gas comprising hydrogen sulfide and sulfur dioxide so as to have a ratio of hydrogen sulfide to sulfur dioxide exceeding 2:1, preferably from 2:1 to 30:1. The combustion gas is reacted under Claus reaction conditions to yield a reaction gas comprising sulfur. Sulfur is recovered from the reaction gas to yield a tail gas comprising a concentration of hydrogen sulfide and less than 1000 ppm sulfur dioxide. The tail gas is contacted with a lean absorbent thereby remove from the tail gas a portion of the hydrogen sulfide contained therein and to yield a sweet gas and a rich solvent comprising dissolved hydrogen sulfide. The dissolved hydrogen sulfide of the rich solvent is biologically oxidized to elemental sulfur by contacting the rich solvent with sulfur bacteria under suitable biological oxidation conditions with the rich solvent.



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