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Description of Various Processes for H₂S Extraction from Gases or for Recovery of S from Gases containing H₂S

1) Patent application Z 23.254. 121-17

Process for Catalytic Recovery of S from H₂S Containing Gases

Process for catalytic recovery of S from containing gases H₂S which contain hydrocarbons as impurities whereby the temperature of the mixture consisting of H₂S-containing gases and of the air, which is required for the combustion, is raised above 350°C., if necessary to 600°C., whereby such catalysts are used which do not disintegrate under the influence of the elevated temperature. The catalyst, consisting of pulverized Bauxite, is pressed into granules or tiny tubes; binders are admixed which under the influence of the temperature are sintered.

Process for the recovery of sulfur
Patent application: J. 61.007-121-17

Claim: Process for the recovery of sulfur by burning H₂S or containing gases H₂S by an admixture of less oxygen (or oxygen containing gases) than are required for the complete transformation of the H₂S into SO₂ and by removing the heat of reaction using a boiler so that the waste gases which leave the boiler are brought react in the presence of water.

Example: A gas consisting of 90% H₂S and 10% CO₂, after admixing such a volume of air as is necessary for the oxidation of H₂S to S, is fed to a stoker. 85% of the H₂S transformed into elemental S by the combustion. Assume that the waste gases leave the stoker with a temperature of 145°C., 96% of the total heat of combustion can be recovered in the form of steam. The stoker, which generates steam at 2.5 atm., is inclined in the direction of the gas flow in such a manner that the liquid sulfur can be drained and collected in a properly insulated and heated pipe. The waste gases which leave at a temperature of 145-150°C., are led to a condenser through which they are passed from the bottom to the top. Water is injected as a spray at the top of the condenser. The gases are cooled to 60°C. and are led to 2 scrubbers which are packed with wooden hurdles and into which 3 m³ H₂O (35°C.) for each 100 m³ gas are injected. The scrubbers are operated in parallel. Together with the liquid, the gas flows from the top to the bottom of the scrubber and is discharged at a temperature of 45°C. Since it contains but 1% of the total introduced sulfur it can be easily discharged into the open air. The water which is drained from the scrubbers is united with that of the condenser and transferred to a separating vessel which is divided into several sections. The coarsest sulfur particles are deposited in the first section. They are drawn off by means of a diaphragm pump and transferred to a pressure vessel in which they are melted down by means of injected steam.

Memorandum: Desulphurization process for gases

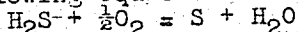
A disadvantage of most of the hitherto employed gas-desulphurization processes is the fact that the H_2S present in the water gas is recovered as elemental sulfur only after application of the combined scrubbing-claus-kiln-process or the spent-iron-ore-extraction-process.

It was therefore attempted to devise a method by which it would be possible to precipitate the H_2S present in the water gas directly as elemental sulfur.

Due to the different ignition points (table 1) of the gases present in the water gas a selective combustion of the H_2S should be possible. Experiments in this direction were started February 20, 1939

Type of gas	Ignition point in oxygen °C.
H_2S	220
H_2	450
CO	590
CH_4	645

A small laboratory furnace was employed, the inside diameter of which was 18 mm. The heated length was 400 mm. Picture 1 represents the apparatus. To the water gas which had been partly liberated from H_2S by a preceding process 0.4% vol. of oxygen was added. Applying temperatures of 170-250°C, the gas was led over a catalyst (Bauxite) with a velocity of 100 liters per hour. Before the catalyst the sulfur content of the gas was 4 g per m^3 whereas after the catalyst only 1.5 per m^3 were determined. The experiment was repeated several times whereby the same results were obtained. The longest test run was 5 hours. It was possible to remove about 63% of the H_2S -sulfur according to the following equation:



The formation of heat due to the combustion of H_2S is as high as 2,976 k.cal. per $N m^3$ of H_2S burned.

Near the cold end of the reactor the elemental sulfur was deposited. Depending on the particle size the color of the sulfur was white or yellow. (Picture 2) The smallest sulfur particles were trapped by means of a water filled washing bottle. No SO_2 however could be found in the water.

It was possible to burn selectively the H_2S present in a gas mixture (water gas) applying a catalyst and temperatures of 180-250°C. without burning the other constituents or forming SO_2 .

Due to the heat of reaction the heating system of the furnace could be burned off for nearly half the time of the test run.

The computation of the heat balance of the process showed that by burning 3 liter H_2S per 1 m^3 water gas it should be possible to operate without additional heating.