

Annual Reports on Hydrogen Manufacture - 1941-42.

An average of 14.5 water gas generators were operated during the year. They produced a total of 38,650,000,000 cubic feet of gas requiring 725,000 tons of coke. The specific coke consumption was 1.8 tons per 100,000 cubic feet of gas. The heating gas delivered amounted to about 11,590,000,000 cubic feet of a heating value of 540-720 B.t.u. (lower heating value). The heating gas contained 61% of "residual water gas". A total of 880,000 tons of steam (250 psig.) were produced during the year.

The desulphurization unit was provided with a prewash system in order to treat part of the stream to the Alkacid unit. Caustic potash was used as absorption liquid in the prewash system. The solution has to be renewed every two months and HCN removal is only obtained by the fresh solution for about two weeks.

Difficulties were experienced with the operation of the Alkacid unit due to faulty analytical results and high solution temperatures. 236,000,000 cubic feet of recovered gas containing 28 to 29% hydrogen sulphide was delivered to the Claus oven; this corresponds to 4400 tons of sulphur.

The hydrogen converter unit suffered from excessive pressure drop through the catalyst which was caused by the high salt content of the condensate water used since the salt leads to the formation of a solid cake by clogging up the catalyst pores.

1942-43.

On the average, 15.7 water gas generators were in operation. The generator capacity lay between 296,500 to 311,000 cubic feet per hour of water gas. The yearly average was 300,000 cubic feet per hour. A total of 767,000 tons of dry coke were gasified and the specific coke consumption was 1.8 tons per 100,000 cubic feet of water gas.

On the average, 81,600 tons of steam (250 psig.) were produced per month.

Removal of hydrogen sulphide in the Alkacid unit was difficult because of the clogging of the absorbers by corrosion products. For corrosion protection the bubble trays of the absorbers have been treated with special lacquers (Nioresit, Munkalit, B-5 Alkali Resistant, Pervinan) and the iron bubble caps have been replaced by ones made of a phenol-formaldehyde plastic (Mipolam).

The unsatisfactory operation of the hydrogen sulphide absorption plant led to difficulties in the hydrogen converter unit by lowering the lifetime of the catalyst. Other difficulties were caused by insufficient cleanliness of the condensate water.

1943-44.

Difficulties with hydrogen sulphide removal in the Alkacid unit were overcome by decreasing the pressure drop in the absorbers caused by corrosion products and by removal of part of the H₂S and HCN by means of caustic. In order to remove the HCN to a residual concentration of 70.8 mg. per 1,000 cubic feet, the gas is washed with polysulphide solution containing one pound of potash and 0.008 pounds of sulphur per gallon of solution.

This solution is used at a rate of 21.1 gallons per 1,000 cubic feet. The gas contained originally 2,270 to 2,550 mg. of HCN per cubic foot, of which 60% is removed in the gas scrubber and 20% in the direct injection cooler.

The H₂S content of the gas is, on the average, 90 mg. per cubic foot. The hydrogen sulphide content is reduced to 60 mg. per cubic foot in the preliminary washers and to 16 mg. per cubic foot in the final purification. Both stages use Alkazid solution. The total circulation rate is 7.7 gallons per 1,000 cubic feet of gas and the distribution of this rate on preliminary and final purification is dependent on the operational requirements. At the beginning of the report period, production amounted to 3,780,000 cubic feet per hour of "O" water gas (equal to 3,250,000 cubic feet of pure hydrogen per hour), and this production could be raised to 4,375,000 cubic feet of "O" water gas per hour (corresponding to 3,885,000 cubic feet of pure hydrogen); this was the highest output reached before the plant was destroyed by air attack.

The following schedule was followed in the plant for operating the water gas generators:

Blowing - - - - - 35 to 37% of operating time
Gasification from the bottom -
 for residual gas - 8% of operating time
 for "O" water gas - 27 to 28% of operating time
Gasification from the top -
 25. to 28% of operating period

18% of the gas produced at first during each gasification period was taken off as "residual water gas".



