ATTACHMENT VI.

DESCRIPTION OF THE LUBRICATING OIL PLANT RHEINPREUSSEN.

Lurgi Gesellschaft - 31st May, 1945.

Drawing AS 1263 is a flow sheet of the lubrciating oil synthesis plant.

The first stage in the process is the chlorination of the crude distillate from the Fischer Tropsch synthesis boiling between 200° and 350°C. This stage is worked discontinuously. A quantity of about 1 m^3 of crude distillate is pumped through the chlorine-tower for several hours. A temperature of between about 80° and 100°C is obtained by means of a heat exchanger. This temperature is maintained later when the heat of reaction is conducted away by cooling. Chlorine is drawn as a liquid from the stock tank which is under the vapour pressure of the liquid chlorine - about 10 - 15 atm. The chlorine expands and vapourises at the throttle valve and is then led into the bottom of the chlorine tower. HCl gases escape at the top of the tower; they are cooled in a cooling tower and then led out of the process into a gasometer. The cooling tower is cooled indirectly by means of gasoline as cooling liquid. This is kept in circulation and maintained at a low temperature by means of a cooler. The chlorinated intermediate product is stored in a storage tank and thence led into the second stage.

The second stage consists of the synthesis. The chlorinated crude distillate is mixed with gasolene and naphthalene in stirrer vessels, this being done discontinuously. The quantities are measured out in measuring vessels before they are mixed. The measuring vessel for the crude distillate holds 600 litres, those for gasolene and naphthalene hold 1,400 litres. Each of the six stirrer vessels has a capacity of 3 m^3. To start up the synthesis the mixture is raised to about 120°C. by means of the heating jacket around the stirrer vessels and aluminium filings are added. The reaction takes place under atmospheric pressure: the escaping HCl gases are cooled in the same cooling tower as the HCl gases which, as mentioned above, escape during chlorination. The undesirable tar products which are formed during the synthesis are allowed to settle in 4" settling vessels". The deposit is again mixed with gasoline in a stirrer vessel, the tar being extracted in this way. The remaining tar residue is removed. The stirrer vessel for the mixing of tar and gasoline has a capacity of 1 m^3.

The intermediate product produced during the synthesis is led from the settling vessels into two parallel stirrer vessels; there it is treated with fuller's earth and lime at a temperature of 150°. The lime treatment serves the purpose of neutralisation. The used fuller's earth and lime are removed by means of a filter press.

The third stage in the plant consists of distillation. In this stage the intermediate products formed during synthesis are fractionated. Using a distillation tower the low boiling fractions (gasoline and naphthalene) are removed first. The distillation is carried out under an absolute pressure of 200 - 300 mm Hg. The distillation vessel is heated with steam under 100 - 150 atm. pressure. This is heated in an oven and circulates through the oven and the distillation vessel. The fractionating column works continuously and has been constructed for a maximum influx of 1800 kg/h and a maximum quantity of distillate of 1100 kg/h. A low temperature cooling plant separates the distillate from the fractionating column into naphthalene and gasoline. This low temperature cooling plant consists of two chillers which

are cooled to about - 20°C by the evaporation of ammonia; the naphthalene is then separated by means of a centrifuge.

The bottoms in the fractionating tower contain the oils produced by the synthesis. They are cut into four fractions, distillates I, II, III, IV, in a high vacuum distillation apparatus. Distillate IV is the required lubricating oil, whereas distillates I, II and III have lower boiling ranges.

The last stage of the plant consists of the dewaxing and fuller's earth treatment of distillates I, II and III. These two parts of the plant have not been used and are therefore not in action. It had been planned to use acetone as a dewaxing solvent. The mixture of distillate and acetone is cooled to a low temperature in chillers and conveyed on to a down filter of about 1.5 m^2 area and a maximum capacity of 500 kg liquid, acetone and oil. The filtrate is sucked off by means of a vacuum pump. The acetone is distilled off from the dewaxed oil in a stripper. In order to ward off the danger of explosion, the apparatus is filled with an inert gas. The dewaxed oil is finally treated with fuller's earth in a stirrer vessel with a capacity 5 m^3. The used fuller's earth is removed in a filter press.

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