Attachment IV.

Preparation of Aircraft Oils by Copolymerization.

I. G. Leuna Report of March 29, 1943

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The following procedures have thus far been carried out for the preparation of aircraft lubricating oils:

1. Entirely from mineral oils by suitable processing of petroleum.
2. Mixing a diluent prepared from petroleum by a suitable method with a synthetically prepared oil of high viscosity as, for example, SS 906, in 1:1 ratio.
3. Copolymerization of crude SS Oil with an appropriatly pretreated mineral oil fraction, which directly provides a useful oil.

These procedures, which were carried out by Dr. Zorn as early as 1930 with crude polymers from cracked wax, are described below and their advantages are demonstrated both with reference to quality and quantity.

Starting materials of Mineral Origin.

The mineral oil fractions to be used for copolymerization must have a flash point above 225°C and be free of wax. Only small quantities of extract oil need be removed by extraction with a selective solvent as, for example, 6 per cent in the case of an Ostmark oil, whereas at least 25 per cent extraction and very often more is necessary in the preparation of the oils mentioned in the introduction. For purposes of copolymerization a higher proportion of these substances which are otherwise extracted may remain in the mineral oil; in the course of the reaction they are partly converted into useful lubricating oils and partly precipitated with aluminum chloride. Copolymerization therefore results in an appreciable conservation of useful mineral oils.

Procedure.

Ethylene is polymerized as customary for the preparation of SS Oil, is introduced into preheated mineral oil, and then stirred, one part of straight SS-Oil being taken for 1.5 parts of mineral oil.

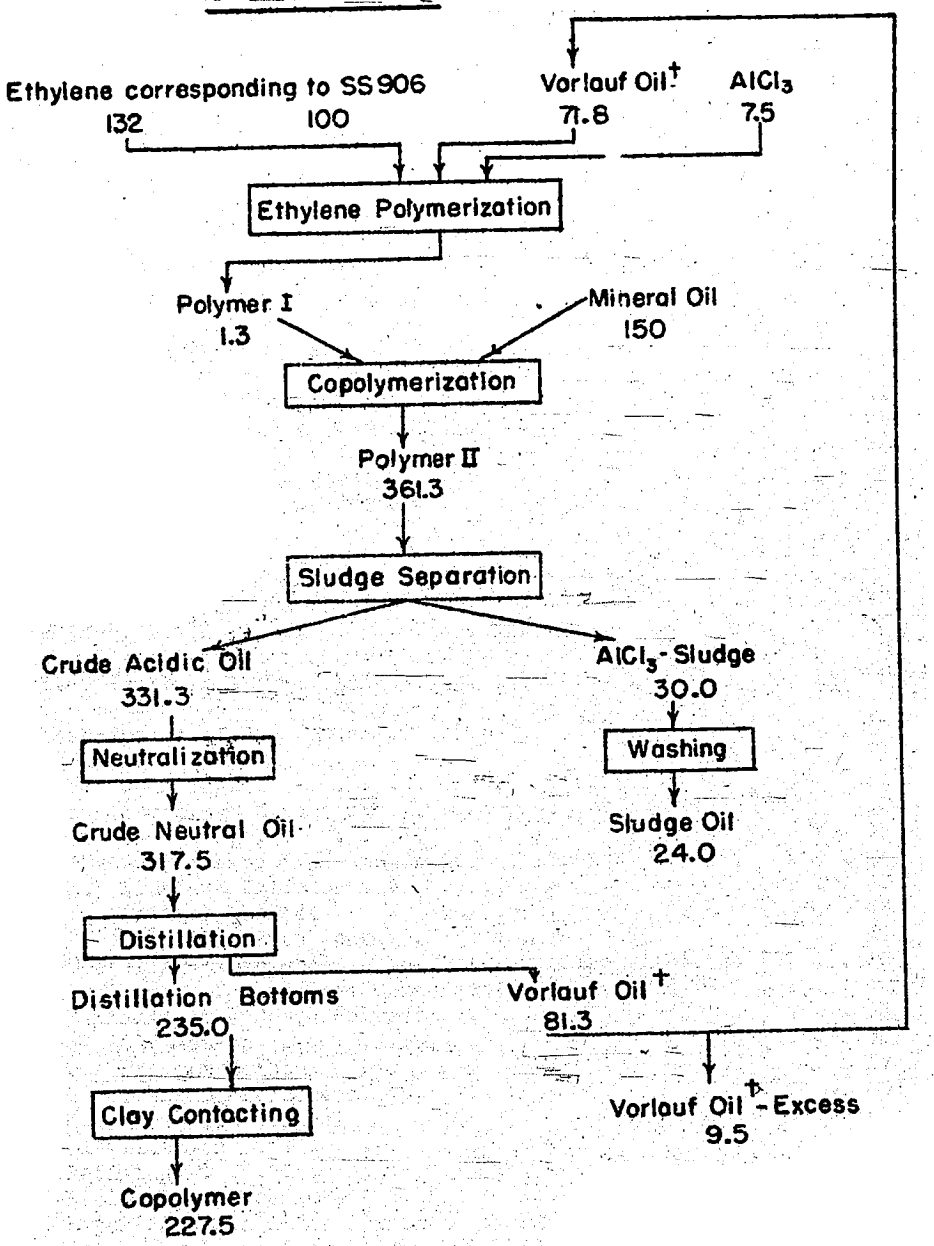
After reaction is completed and the mixture allowed to settle for about two hours, most of the sludge is drawn off whereas the rest is separated by centrifuging. The aluminum chloride is removed from the sludge by washing with water in the presence of a solvent, and a soft black asphaltic material obtained which is called "sludge oil". No R-Oil+ is obtained here which is suitable for preparing axle oil. The usefulness of the "sludge oil" with reference to rubber and varnishes is still under investigation. The crude oily product, free of sludge but still acidic, is neutralized by stirring with slaked lime which is then removed in a filter press, the crude neutral oil is topped and the distillation bottoms finally contacted with clay.

Flow diagrams for the process are given in Figures 1 and 2. Specifically, Figure 2 shows that the copolymerization components derived in processing 100,000 tons of petroleum per year suffice to convert the SS-Oil output of SS-Oil Plant Heydebreck I. into copolymer oil. (Figure 1 is given but Figure 2 is missing.)

+ R-Oil is obtained on neutralizing the $AlCl_3$ catalyst from synthetic lubricating oil (polyethylene) manufacture.

FIGURE 1.

FLOW DIAGRAM 1.



† Low-boiling hydrocarbon recycle stock.