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2,892,877

PROCESS FOR THE CONVERSION OF PARAFFIN INTO RUBBER-LIKE PRODUCTS

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This invention relates to conversion of paraffins into rubber-like products.

It is known that paraffin, which is solid at normal temperature, may be converted into hydrocarbons containing olefinic bonds by chlorination and subsequent dehydrochlorination. In this known product less than 1 gram atom of chlorine is generally added per mol of hydrocarbon in order to obtain as high as possible a yield of mono-olefinic products.

It has also been suggested to convert hard paraffin from the Fischer-Tropsch synthesis or fractions obtained from hard paraffin into flexible waxes having properties which correspond to microcrystalline petroleum waxes. This conversion is effected by the addition of more than 1 gram atom, as, for example, 2-4 gram atoms of chlorine per mole of hydrocarbon to the hard paraffin or fraction, and by thereafter subjecting the chlorinated products to a dehydrochlorination.

In accordance with the invention it has now been discovered that paraffin having more than 20 carbon atoms in the molecule may be readily converted into rubber (caoutchouc)-like products by adding more than 4 gram atoms of chlorine, and preferably 6-10 gram atoms of chlorine per mole of paraffin, and subsequently subjecting the reaction products obtained to a dehydrochlorination.

The quantity of chlorine to be added is dependent upon the average number of carbon atoms in the initial paraffin. About 6 gram atoms of chlorine per mole should be added to hard paraffin from the Fischer-Tropsch synthesis, having, for example, a boiling range of above about 460° C. and an average number of carbon atoms of about 45. Paraffins having a lower number of carbon atoms such as slab paraffins require 7-8 gram atoms of chlorine per mole, while about 10 gram atoms of chlorine per mole must be added to paraffin having a still lower number of carbon atoms, such as soft paraffins.

The chlorination in accordance with the invention is effected in the conventional manner by introducing gaseous chlorine into the melted hard paraffin at a temperature ranging slightly above the melting point of the paraffin. The chlorination may be effected at normal atmospheric pressure or at slightly elevated pressure. The dehydrochlorination is effected by heating the chlorinated products for several hours at a temperature of between about 250° and 320° C. During the dehydrochlorination it is preferable to introduce a small amount of nitrogen and to admix several percent by weight of activated carbon.

The dehydrochlorination is most preferably effected at

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a partial vacuum or at normal atmospheric pressure. It is also possible, however, to dehydrochlorinate at a slight superatmospheric pressure up to about 5 kg./sq. cm.

Suitable starting products for the process of the invention are all of the paraffins having more than 20 carbon atoms in the molecule, viz. synthetic paraffins as well as paraffins derived from the processing of petroleum.

The following examples are given by way of illustration and not limitation:

Example 1

A hard paraffin from the catalytic hydrogenation of carbon monoxide, containing the hydrocarbons boiling above 460° C. and having a setting point of 98° C. and an average number of carbon atoms of 48 was chlorinated at 120° C., while irradiating and stirring until 6 gram atoms of chlorine had been taken up per mole. The product obtained was then heated to 300° C. while passing through a stream of nitrogen. After heating for 5 hours, the content of the flask solidified. The product formed was insoluble in most solvents and could not be melted below a temperature of about 200° C. It showed elasticity to compression and was of caoutchouc-like character.

Example 2

Slab paraffin derived from petroleum, having a setting point of 52° C. and an average number of carbon atoms of 28 was treated with chlorine at 70° C. while stirring until 8 gram atoms of chlorine had been taken up per mole of hydrocarbon. The chlorinated product was heated to 300° C. while passing through a stream of nitrogen. After 8 hours the mass solidified. There was formed a product which would only melt with decomposition.

Example 3

C₂₂ hydrocarbons from the catalytic hydrogenation of carbon monoxide, the unsaturated portions of which had previously been hydrogenated were chlorinated at 60° C. while stirring until 10 gram atoms of chlorine had been taken up per mole. The chlorinated product was heated to 300° C. while passing through small amounts of nitrogen. After 8 hours, a product was obtained which melted at temperatures of above 200° C. with decomposition.

We claim:

1. Process for the production of rubber-like products from paraffin which comprises chlorinating a paraffin having more than 20 carbon atoms in the molecule with an amount of chlorine corresponding to at least 10 gram atoms of chlorine per mol of paraffin having about 22 carbon atoms in its molecule, at least 8 gram atoms of chlorine per mol of paraffin having about 28 carbon atoms in its molecule and at least 6 gram atoms of chlorine per mol of paraffin having about 48 carbon atoms in its molecule, thereafter dehydrochlorinating the chlorinated reaction product by heating to a temperature between about 250-320° C. for at least several hours and recovering the rubber-like product formed.

2. Process according to claim 1 in which said chlorination is effected in the presence of nitrogen.

3. A rubber-like paraffin product obtained by dehydrochlorinating a chlorinated paraffin having more than 20 carbon atoms in the molecule and 6-10 gram atoms of chlorine per mol according to the process of claim 1.

4. A rubber-like paraffin product obtained by dehydrochlorinating a chlorinated paraffin having about 22 car-

bon atoms in the molecule and 10 gram atoms of chlorine per mol according to the process of claim 1.

5. A rubber-like paraffin product obtained by dehydrochlorinating a chlorinated paraffin having about 28 carbon atoms in the molecule and 8 gram atoms of chlorine per mol according to the process of claim 1.

6. A rubber-like paraffin product obtained by dehydrochlorinating a chlorinated paraffin having about 48 carbon atoms in the molecule and 6 gram atoms of chlorine per mol according to the process of claim 1.

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1,591,984
2,403,179
2,708,210
2,795,596

505,898

References Cited in the file of this patent

UNITED STATES PATENTS

Krause et al. ----- July 13, 1926
Hull et al. ----- July 2, 1946
Sias ----- May 10, 1955
Kolling et al. ----- June 11, 1957

FOREIGN PATENTS

Great Britain ----- May 12, 1939