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METHOD OF TREATING MINERAL OIL RESIDUES

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5 Claims. (Cl. 196—74)

This invention relates to methods of treating mineral oil residues and is particularly concerned with the treatment of relatively heavy materials produced by distillation of hydrocarbon oils in the presence of alkaline substances. The latter may be naturally present in the oil being distilled, or they may be introduced for the purpose of neutralizing the organic acidic compounds present in the oil. The residues produced by distillation under these conditions are found to contain compounds formed by chemical interaction of the alkali and the organic acidic components of the mass being distilled, to which compounds the general term of naphthenic soaps is here applied. It can be stated that in general any mineral oil residue with alkaline reaction contains napthenic soaps, although free alkali may or may not be present in it at the same time.

It has been found from actual experience that the presence of naphthenic soaps is extremely detrimental whenever the residues containing them are to be treated for producing asphaltic materials. These residues usually are very viscous, heterogeneous and tacky; they are very difficult to handle on account of their tendency to plug the lines, form very troublesome emulsions, and produce asphalts of similarly undesirable characteristics.

The object of this invention is to provide a method of converting the above described undesirable residues containing naphthenic soaps into very useful and valuable products, from which asphalts of high quality can be successfully made.

I have discovered, that in order to improve the above described undesirable products, i. e. residues having distinctly alkaline reaction, it is necessary to decompose the naphthenic soaps present therein, and then treat the resulting material by any suitable method for making asphalt. I have found that it is not necessary to remove the naphthenic soaps from the residue, but uually it is sufficient to decompose these compounds and leave the products of decomposition in the treated residue. It should be understood that the removal of the naphthenic soaps accomplishes the purpose of improving the residues and may be preferred in some cases.

According to my invention a number of methods can be employed for decomposing or removing the naphthenic soaps from the residues. As an example, the soaps can be salted out by contacting the residues containing them with salt solutions. I prefer, however, to decompose these soaps by subjecting the residues in which they are present to the neutralizing effect of an acid treatment. The resulting material consisting of the partly acidified residue containing the products of decomposition of the naphthenic soaps is then subjected to an oxidizing treatment for production of asphalt.

In carrying out my process in actual practice I may employ any suitable mineral oil containing naphthenic soaps and capable of being oxidized to an asphalt. Such residues are usually produced from crude petroleum by distilling off light fractions, such as gasoline, kerosene, stove oil, and lubricating fraction; residues from distilling of cracked products also often contain alkalies and can be treated by my method. The oil being distilled is made to react alkaline in order to prevent the naphthenic acids from being distilled over. Either hydroxides or carbonates of sodium, potassium, calcium and magnesium may be used to neutralize the organic acidity in the oil being distilled. The naphthenic soaps resulting from the neutralization and the excess of alkali, if such an excess was added, remain in the residue, and, as already has been explained, render it unsuitable for immediate use as an asphalt base.

In order to decompose the naphthenic soaps I treat the residue containing them with a sufficient amount of a mineral acid reagent, such as either commercial sulfuric, or phosphoric, or hydrochloric acids, or acid sludge, resulting from treating oil with an acid, containing a mineral acid and capable of decomposing the naphthenic soaps. A thorough contact between the acid and the residue, preferably at a temperature of 200° C. or above, is effected by means of vigorous agitation in a vessel, or by mixing the two liquids in a centrifugal pump and/or by passing the mixture through some other mixing device. The quantity of the acid reagent is regulated and the reaction is controlled by testing the decreasing alkalinity of the treated residue. The addition of the acid reagent is discontinued as soon as the naphthaneic soap content is substantially reduced, and I prefer to acidify the residue until a substantially neutral reaction of the residue is effected. This resulting material is ready then to be oxidized for the production of asphalt, for instance, by air-blowing, which treatment I prefer to carry out at a temperature between 250°–300° C.

I claim as my invention:

1. In the process of manufacturing asphalt

from a residue containing naphthenic soaps the steps of reducing the naphthenic soap content of the residue by adding just enough of a mineral acid thereto to decompose at least a portion of the naphthenic soaps and then converting the substantially neutralized residue into an asphalt.

2. In the process of manufacturing asphalt from a residue containing naphthenic soaps the steps of reducing the naphthenic soap content of the residue by adding just enough of acid sludge thereto to decompose at least a portion of the naphthenic soaps and then converting the substantially neutralized residue into an asphalt.

3. In the process of manufacturing asphalt from a residue containing naphthenic soaps the steps of reducing the naphthenic soap content of the residue by treating the residue with just enough of a mineral acid, to decompose the soaps, and then converting the thus treated chemically substantially neutral residue, containing products of decomposition of the soaps, into asphalt by an oxidizing treatment.

4. The process of claim 3 wherein the acid treated residue is converted into asphalt by blowing with air at temperatures between 250°–300° C.

5. The process of claim 3 wherein the acid treatment is carried out at temperatures above 200° C.

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