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PROCESS FOR THE MANUFACTURE OF ASPHALTIC MATERIAL

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1 Claim. (Cl. 196—22)

This invention relates to a process for the manufacture of asphaltic material.

The present invention has among its objects the provision of a process wherein highly elastic products may be obtained from petroleum crudes and distillation residue.

My invention is characterized in that the asphaltic product obtained has high elasticity at room temperature, low susceptibility to temperature changes, high temperature of flow, high flash point, general resistance to weathering, and low viscosity at elevated temperatures.

Another object is the provision of an improved process for treating asphaltic crudes and residue in such a manner that the resulting product is almost completely soluble in organic solvents, does not fume when hot, possesses no disagreeable odor or tasts, is impermeable to aqueous liquids, and is highly resistant to damage by chemicals.

A further object is utilization of a process with asphaltic crudes and residue wherein a reagent is used which in itself is not an oxidizing agent, and in which the reaction with the asphalt is one of addition rather than substitution.

Another object is the provision of a process for treatment of asphaltic crudes and residue which does not increase the content of ash nor of material insoluble in organic solvents nor water soluble chemicals.

Another object is the provision of an asphaltic product which can be readily distinguished from straight airblown asphalt made from the same charge stock by its improved elasticity and temperature resistance.

The inventor is aware that many methods and processes have been devised for the treating of asphaltic crudes and residue, and wherein distillation has been employed for the purpose of removing light oils to obtain a residuum of the desired flash point. Further, that methods have been practiced wherein oxidation of the asphalt has been accomplished by mixing the same with air in the well known airblowing method for the purpose of increasing the solids content of the stock. This airblowing method results in a product wherein the higher the temperature and the greater the quantity of the air, the harder will be the product. In addition to the well known use of air in the airblowing method or process, various methods have been employed to overcome the objectionable features of straight airblowing. I may mention the use of lube oils and waxes. However, the use of oils and waxes in addition to the charge stock decreases the weather life of the product. Another method employed has been that of oxidation of the charge stock with oxidizing acids, either alone or in conjunction with air, and sulfuric acid has been used for this purpose. Other acids have been employed, such as phosphoric and nitric. Inorganic and non-metallic chemicals, such as selenium sulfide, phosphorous oxy-chloride, silicon fluorform, have been employed as catalysts in the airblowing process. The function of these catalysts is well understood, in that these materials are capable of forming acids under the conditions of treatment and are oxidizing agents in the sense that they may cause a decrease in the hydrogen content of the asphalt and may themselves be chemically reduced.

Oxidation with inorganic metallic oxides, either alone or in conjunction with air, has been employed, and use of condensation reagents with air have been proposed as catalysts for air oxidation. However, these methods are objectionable on the basis of cost, ash content, and soluble ion content. Finally, it has been proposed to add to the asphalt highly absorbent, finely divided solids, such as lamp black, bentonite, clay, etc., and while these materials improve the elasticity of the asphalt, nevertheless they are objectionable because of cost, water permeability, or ash content.

Primarily my invention produces no ash and does not adversely affect the water impermeability of the asphalt nor render it less resistant to water, and imparts no taste or odor to the asphalt, nor lessens its solubility in organic solvent, and greatly improves the physical properties of the asphalt, such as those I have previously set forth as of high elasticity at room temperature, etc., in paragraph 3, page 1.

In the practice of my process, the charge stock, asphaltic crude and residue, is subjected to a reagent in addition to the use of airblowing the charge stock either before or during the introduction of the reagent, or after airblowing or simultaneously introducing the reagent with airblowing.

The reagent which I have found best in the carrying out of my process and in the attaining of the objects before specified has the following characteristics: Acidic in nature or produces acidic reactants, contains no metallic atoms, is not primarily an oxidizing agent, forms addition products with the higher olefins, and does not materially reduce the hydrogen content of the asphalt.

Hydrochloric acid, hydrogen chloride, alkyl

acid halides, alkyl nitrites, and trichloroacetic acid are reagents having the characteristics set forth. There are others, and these are given as examples. The hydrogen halides, such as hydrochloric acid and hydrobromic acid, have the characteristics desired.

Briefly in the carrying out of my process, I may follow any one of several procedures, as follows:

To a suitable charge stock at a temperature of approximately 270° F. is added very gradually to prevent foaming, from 0.4% to 1.2% by weight of 22° Baumé hydrochloric acid. The purpose is to obtain substantially complete absorption of the free hydrochloric acid. The mixture is circulated for several hours, and then airblown at a suitable temperature, around 425° F. This process produces, as hereinafter pointed out, a product which is elastic and temperature resistant, and is in accordance with the objects of this invention.

As a modification of the process, it is sometimes beneficial to singly or together,—mix the acid with the charge under pressure; airblow with a constantly rising temperature; introduce the acid during or after airblowing. It is not the intent of this invention to limit the same to any particular type of equipment, as the process may be carried out in a still in which the asphalt is circulated by a pump, such as is utilized in the well known Gard-Aldrich equipment, and in which instance the acid is introduced into the pump through the air line or into the asphaltic charge just before it enters the pump during circulation. A noticeable feature of the process just outlined is its low cost and time saved as the time of airblowing is considerably reduced when the reagents named, such as hydrochloric acid, are used. By way of example, a typical comparison between the products made using hydrochloric acid and those made by straight airblowing from the same charge stock is as follows:

	Using HCl	Straight airblown
Softening point, ° F.	233	216
Penetration at 77°, 100 g. 5 sec., decimillimeters	23	15
Ductility, cubic centimeters	4.2	2.5
Flash point, ° F.	460	435
Pen. at 32° F., 200 g. 60 sec., decimillimeters	16	11
Pen. at 115° F., 50 g. 5 sec., do	30	30
Time of blowing, hours	8	12
HCl, percent	0.9	

The inventor is aware that hydrochloric acid has been used in bitumens. However, in all the processes now known to the inventor, the use of the acid has been for the purpose of making the asphalt more acid and alkali-proof or to obtain a polymerized heavy tar and light oils and in which the benzol and naphthalene are liberated for subsequent distillation, the residue obtained being a thick tar rather than an elastic asphalt.

I claim:

The process of treating a charge stock of asphaltic crude and residue, which consists in first heating said charge stock to substantially 270° F., adding substantially from 0.4% to 1.2% of 22° Baumé hydrochloric acid in such a manner as to effect substantially complete absorption of free hydrochloric acid, circulating the same, and thereafter airblowing the mix at substantially 425° F.

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