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SATURATING ASPHALT

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This invention relates to improvements in saturating materials such as rag felt, asbestos paper, etc. with asphalts and particularly when using asphalts that are solid at ordinary temperatures and are applied in a molten state at elevated temperatures.

In the preparation of asphalt shingles, building boards and other materials wherein rag felt, asbestos paper, etc. are coated with asphalt, an elevated temperature of about 400° F. is required. The rag felt or other fibrous material that is used generally contains small amounts of moisture, which moisture cannot be readilly removed without subjecting the rag felt to elevated temperatures over extended periods of time. When the rag felt containing small percentages of moisture is contacted with the hot asphalt that is used to saturate the rag felt, there is a marked foaming tendency of the asphalt which is believed to be due to the small percentage of moisture present in the rag felt. In roofing manufacture the use of saturants with high (bad) foaming qualities may affect the efficiency of the saturation and also result in an overflow of the saturant from the saturating kettles. This tendency to foam has been reduced in the past by the addition of stearic acid and other non-asphaltic materials which materially increased the cost of the product and sometimes also affected the weathering properties of the asphalt.

It is an object of this invention to prepare an asphaltic material which will not foam excessively when subjected to an elevated temperature and used to saturate a fibrous material containing a small percentage of moisture.

Another object of this invention is to provide an asphaltic material consisting solely of hydrocarbon compounds that does not foam excessively.

According to this invention, it is found possible to blend various asphalts of the same or different crudes and thereby regulate the foaming tendency of the asphalt. As an example of this improvement to be obtained, a 260 seconds Furol viscosity at 210° F. flux asphalt produced by straight reduction in a pipe still of a Colombian crude was blended with an asphalt oxidized from the same flux asphalt to 241° and 280° F. softening points, respectively. The final blends were of 160/200 penetration and are compared in respect to foaming properties with a 160/200 penetration asphalt produced by direct oxidation of the 260 seconds Furol flux itself. The desired improvement in foaming tendency is accomplished by blending a straight reduced asphalt of relatively low consistency with an oxidized asphalt of relatively high consistency.

The foaming of the asphalts was compared by test method No. 1 in which:

200 grams of the asphalt under test are heated to 420° F. and 185 grams of this are poured into a thin walled cylindrical copper container open at the top, having an inside diameter of 4⅛ inches and 11 inches high, with small lugs placed 1½, 2½, 3½, 5, 6, 7, 8, 9 and 10 inches from the bottom. The container is well lagged on the sides but not on the bottom. The asphalt and container is maintained at a temperature of 400° F. plus or minus 3° F. A sheet of blotting paper, 3 x 3 inches in area, is air dried and moistened with 3.3 ml. of water in such a manner that even saturation of the paper is obtained in approximately 45 seconds. The wet paper is immersed in the hot asphalt and pushed to the bottom of the container with a long stirring rod. Observations are made of the maximum height to which the foam rises, and the period of time from the introduction of the water-moistened paper until the foam has subsided to the lug placed 2½ inches from the bottom of the container, this being the subsidence time. As the foam subsides the stirring rod is gently run around the edge of the foam in order to promote even subsidence. and to more closely detect the time at which the foam reaches the 2½ inch lug.

Foam test #1

160/200 Pen. Colombian asphalt saturant	Foaming properties	
	Max. height of foam, inches	Time to complete subsidence, seconds
Oxidized from 260 Furol/210° F. flux	3.85	836
By blending 73.8%—260 Furol-flux, 26.2%—241 S. P. oxid. asph.	3.25	395
By blending 74.6%—260 Furol-flux, 25.4%—280 S. P. oxid. asph.	3.75	334

Other asphalts of greater or lesser softening points may be used.

In another series of tests using derivatives of a Venezuelan crude oil, a 280/300 seconds Furol viscosity at 210° F. straight reduced Venezuelan flux asphalt was oxidized to 160/180 penetration. Two other 160/180 penetration products were produced by blending (1) 61.5% of 100 seconds Furol viscosity at 210° F. flux with 220/235 softening point oxidized asphalt, and (2) by blending 91% of an 85° F. softening flux with 9% of the same 220/235 oxidized asphalt. These three asphalts were compared for foaming properties

according to the following test method No. 2 in which:

A sample of 250 grams of the asphalt is brought to a temperature of 400° F. in a 1000 cc. tall form Pyrex beaker of internal diameter approximately 3½ inches and height approximately 7½ inches. A 3-inch wide strip of standard 52# rag felt 12 inches in length is placed in an oven maintained at 220° F., dried for 30 minutes, removed, allowed to cool in a desiccator and ½ cc. of water evenly distributed over a 3 square inch area at the end of the felt. The strip of felt is then held vertically with the damp end on the bottom, dipped into the hot molten asphalt to the full depth of the liquid, held there for 15 seconds and removed. An interval of one minute is allowed between wetting and placing the felt in the asphalt. During the immersion period the felt is slowly revolved (1 to 1¼ complete turns) to evenly distribute the foam. Upon removal of the felt from the asphalt, it is held with one corner down and the foam allowed to drip from the felt for a period of about 5 seconds. The seconds required for the first clear spot and the disappearance of all the foam is noted.

160/180 penetration Venezulean flux asphalt	Foaming properties		
	Inches of foam	Subsidence time	
		First clear spot	All clear
		Seconds	*Seconds*
Oxidized from 280/300 Furol flux	2	275	930
Blend #1	1½	185	760
Blend #2	1¾	140	645

Furthermore, this blending procedure for improving the foaming properties of an asphalt would permit more flexible operation in the refinery since only two materials, namely, low viscosity flux and high softening point oxidized asphalt, would be required as subsequent blending in the proper proportions would only be necessary to meet the different saturating asphalt specifications required by different purchasers.

In addition, saturating asphalts thus produced by blending can be oxidized to coating asphalts without any impairment of the weathering characteristics or physical properties over that obtained on coating asphalts produced from the usual saturating asphalts.

It is not necessary, to obtain this improvement in foam, that the flux and oxidized asphalt be obtained from the same crude source, as mixtures of ingredients obtained from different crudes may be used. When blending fluxes and oxidized asphalts of different crude bases, allowance is made for the natural foaming tendencies of these ingredients as a Venezuelan flux has less foaming tendency than that produced from Colombian flux. Consequently, in cross blending asphalts from different crude sources, the predominant proportion of the final blend should consist of that flux made from the source having the lower foaming tendency in order to attain the maximum improvement; e. g. Venezuelan flux and Colombian 220/235 softening point oxidized asphalt rather than Colombian flux and Venezuelan 220/235 softening point oxidized asphalt. However, improvement is still obtained if this is not carried out, and the relative improvement will be governed by the asphalt source predominant in the blend.

The foam properties of different blends are illustrated in the table following:

	Composition of flux	Saturant		
		Prepared by—	Physical inspections	
			S. P.	Pen. 77° F.
1	100%-78/83 S. P. Venez. flux	Oxidation to	105	165
2	76%-78/83 S. P. Venez. flux, 24%-220/235 S. P. oxidized Venezuelan asphalt	Blended to	104	195
3	74%-78/83 S. P. Venez. flux, 26%-220/235 S. P. Colombian oxidized asphalt	do	105	166
4	72%-80 S. P. Colombia flux, 28%-220/235 S. P. Venezuelan oxidized asphalt	do	103	186
5	71%-80 S. P. Colombian flux, 29%-220/235 S. P. Colombian oxidized asphalt	do	104	191
6	100%-80 S. P. Colombian flux	Oxidized to	106	172

	Composition of flux	Foam properties by test No. 2		
		Height of foam rise, inches	Time to 1st clear spot, seconds	Time to total clearance, seconds
1	100%-78/83 S. P. Venez. flux	2	275	930
2	76%-78/83 S. P. Venez. flux, 24%-220/235 S. P. oxidized Venezuelan asphalt	2¾	147	535
3	74%-78/80 S. P. Venez. flux, 26%-220/235 S. P. Colombian oxidized asphalt	2¾	225	910
4	72%-80 S.P. Colombian flux, 28%-220/235 S. P. Venezuelan oxidized asphalt	2	250	1,005
5	71%-80 S. P. Colombian flux, 29%-220/235 S. P. Colombiain oxidized asphalt	2¼	355	900
6	100%-80 S. P. Colombian flux	2½	375	1,175

I claim:

1. The method of preparing a building material which comprises impregnating at temperatures above the boiling point of water, a fibrous material containing moisture with a mixture of straight reduced asphalt of relatively low consistency having a softening point ranging from 78 to 83° F. and an oxidized asphalt from a straight reduced crude of relatively high consistency whereby excessive foaming of the mixture is prevented.

2. A method of preparing a building material which comprises impregnating at temperatures above the boiling point of water, a fibrous material containing moisture with a mixture of straight reduced asphalt of relatively low consistency having a softening point ranging from 78 to 83° F. and an oxidized asphalt from a straight reduced crude of relatively high consistency having a softening point of at least 240° F. whereby excessive foaming of the mixture is prevented.

3. The method of preparing a building material which comprises impregnating at temperatures above the boiling point of water, a fibrous material containing moisture with a mixture of a straight reduced asphalt of relatively low consistency having a Furol viscosity of at least 100 seconds at 210° F., and an oxidized asphalt from a straight reduced crude of relatively high consistency having a softening point ranging from 220 to 235° F. whereby excessive foaming of the mixture is prevented.

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