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**PRODUCTION OF FUEL OILS**

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2 Claims. (Cl. 208—366)

This invention relates to the production of fuel oils from residues obtained by the vacuum distillation of waxy crude oils. In particular it relates to the production of fuel oils having a viscosity in the range 40 to 90 cs. at 75° C. and a maximum pour point of 70° F.

In Great Britain, customer specifications for fuel oil viscosities are usually expressed in terms of Redwood 1 seconds at 100° F. However, where at 100° F. solid material such as wax is present suspended in the oil it is not possible to determine the true viscosity experimentally at 100° F. It is necessary in such a case to carry out viscosity determinations at temperatures at which all normally solid materials are dissolved in the oil and to extrapolate back to give a figure for the true viscosity at 100° F. The above fuel oil viscosity specification of 40 to 90 cs. at 75° C. with which we are concerned in the present application is, in fact, the same as a specification of 1000 to 3500 Redwood 1 seconds at 100° F.

Fuel oils may be prepared from high viscosity vacuum residues by blending the residue with a low viscosity diluent, or cutter stock, such as gas-oil, the proportion of diluent depending upon the fuel oil viscosity required. Vacuum residues from a large variety of crudes which do not contain excessive quantities of wax when prepared by normal refinery practice have an equivalent cut point of less than 550° C. corrected to 760 mm. Hg. Generally these residues when blended with the necessary amount of gas-oil to give the required viscosity, yield a fuel oil having a pour point below the specified maximum of 70° F. Vacuum residues obtained by distilling very waxy crudes to a cut point of less than 550° C., however, for example some Libyan and Nigerian crudes, will not blend with gas-oil to give both the required viscosity and a pour point below 70° F. In order to obtain the required pour point these residues have to be blended with so much gas-oil that the viscosity of the resulting blend is less than the specified 40 cs. (1000 Redwood 1 seconds).

In this specification "waxy crude" means a crude oil which contains wax in an amount such that, when conventionally distilled in refinery distillation units to an equivalent cut-point of less than 550° C. corrected to 760 mm. Hg, it gives a vacuum residue having so high a wax content that it cannot be blended with gas-oil to give a blend having a viscosity above 40 cs. at 75° C. (1000 Redwood 1 seconds at 100° F.) as well as a pour point below 70° F.

According to the present invention a process for the

production of a fuel oil having a viscosity within the range 40 to 90 cs. at 75° C. and a maximum pour point of 70° F. from a waxy crude comprises vacuum distilling the waxy crude to obtain a final vacuum residue boiling above 550° C. at a pressure corrected to 760 mm. Hg and blending this heavy residue with gas-oil to give both the required viscosity within the range 40 to 90 cs. at 75° C. and a pour point below 70° F. The cut-point of the residue is preferably as close to 550° C. as is possible consistent with giving a residue which can be blended to give fuel oils of the required specification. The maximum cut-point temperature is below that at which cracking of the feedstock commences. This point will vary from crude to crude but is readily determinable by experiment, for example, for a Nigerian crude the maximum cut-point obtainable without cracking is 595° C. and with a Libyan crude the maximum cut-point is 620° C.

Surprisingly, it has been found that the blending of these heavy, viscous residues with sufficient gas-oil to give fuel oils having viscosities within the specified range also gives pour points below 70° F. The presence of paraffin wax is a contributory factor toward high pour points. Although the wax content of residues expectedly decreases with increasing cut-point, the heavy residues still contain large amounts of wax. Surprisingly, however, it has been found that the deleterious effect of the wax on the pour point of fuel oils blended from heavy residues having cut-points greater than 550° C. is not as severe as would be expected from the actual wax content. It is believed that the hydrocarbon type of the waxy components in distillates derived from waxy crudes changes from predominantly straight-chain to branched-chain hydrocarbons, which may also contain ring structures, as the boiling points of the distillates approach 550° C. It is thought that the decrease in concentration of straight-chain hydrocarbons remaining in the residue is responsible for improved pour points of fuel oils obtained therefrom.

The invention is illustrated with reference to the following example.

*Example*

Vacuum residues were obtained with cut-points in the range equivalent to 550° to 595° C. at atmospheric pressure by redistilling, at 0.2 mm. Hg pressure, a longer residue obtained from Nigerian crude oil. Vacuum residues were also obtained with cut-points in the range 550 to 620° C. by distilling, at 0.2 mm. Hg, a residue prepared by laboratory batch distillation of a Libyan crude oil. Inspection data on these residues and on a typical catalytically cracked gas-oil cutter stock are given in the following Table 1. Inspection data on blends of these residues with various proportions of this gas-oil cutter stock are given in the following Table 2.

It is seen from Table 2 that fuel oil blends having both the required viscosity and low pour point are readily obtainable by blending a heavy residue of sufficiently high cut-point with gas-oil.

TABLE 1

Component	TBP Cut point, ° C.	Kinematic Viscosity cs. at—			Wax Content		Pour Point, ° F.
		170° F.	210° F.	300° F.	Percent wt.	Melting Point, ° F.	
Light Cat. Cracked Gas Oil.....					3.0	95	20
Nigerian Residue.....	550	5,890	978	76.9	13.5	156	135
Do.....	575	16,630	2,229	127.2	12.5	162	
Do.....	595	35,100	3,780	162.9	10.9	167	
Libyan Residue.....	550	4,300	935	94.7	24.8	148	150
Do.....	575	15,500	2,545	172.6	22.4	145	160
Do.....	600	125,000	15,190	649	22.1	133	
Do.....	ca. 620		123,000	1,343	18.8	129	

TABLE 2

Residue	TBP Cut point, ° C.	Proportion of residue in blend with cutter stock, percent wt.	Kinematic Viscosity cs. at—			Viscosity Redwood 1 seconds at 100° F. (Calculated from kinematic viscosities)	Pour Point, ° F.
			170° F.	210° F.	100° F. (Extrapolated)		
Nigerian	550	67	62.0	26.7	560	2,300	75
		61	37.8	17.8	280	1,140	55
		56	26.4	12.4	160	650	50
Do	575	63	56.5	24.9	470	1,900	65
		57	34.4	16.7	230	940	50
		52	23.5	12.1	130	530	45
Do	595	66	114.6	45.4	1,350	5,500	60
		61	54.1	24.4	405	1,650	50
		48	19.5	10.4	99	400	40
Libyan	550	71	101.4	44.2	820	3,300	90
		66	63.7	31.8	360	1,470	70
		62	47.0	23.9	260	1,060	65
Do	575	67	97.2	42.7	800	3,250	90
		57	40.2	21.3	195	794	75
		45	17.5	10.7	60	244	65
Do	600	72	262	99.9	3,000	12,200	75
		61	80.2	37.4	600	2,440	60
		58	61.9	28.9	425	1,730	45
Do	ca. 620	61	91.2	41.8	650	2,650	50
		51	44.7	23.4	220	900	45

We claim:

1. A process for the production of a fuel oil having a viscosity within the range 40 to 90 cs. at 75° C. and a pour point below 70° F. from a waxy crude, such crude containing wax in an amount that, when conventionally distilled in refinery distillation units to an equivalent cut point of less than 550° C. corrected to 760 mm. Hg, it gives a vacuum residue having so high a wax content that it cannot be blended with gas-oil to give a blend having a viscosity above 40 cs. at 75° C., 1000 Redwood 1 seconds at 100° F., as well as a pour point below 70° F., comprising vacuum distilling the waxy crude to obtain a final vacuum residue boiling above 550° C. at a pressure corrected to 760 mm. Hg, and blending this heavy residue with gas-oil in an amount sufficient to give both the re-

quired viscosity within the range 40 to 90 cs. at 75° C. and a pour point below 70° F.

2. A process as claimed in claim 1 wherein the vacuum distillation is conducted to give a residue having a cut-point as close to 550° C. as is possible consistent with giving a residue which can be blended to give fuel oils of both the required viscosity within the range 40 to 90 cs. at 75° C. and a pour point below 70° F.

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