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BLENDING OF MINERAL OILS AND RESIDUES

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2 Claims. (Cl. 196—1)

This invention relates to the art of blending mineral oils and residues and is particularly concerned with prevention of the formation of sludges in the oils obtained by dilution of certain petroleum or similar hydrocarbon residues with lighter mineral oil distillates.

The difficulties often encountered when fuel oils are made by diluting the heavy petroleum residues with lighter distillates are well known. The blended oils made from these heavy residues usually have a tendency to precipitate carbonaceous sludge, or sediment, which causes plugging of the fuel lines and burners, sticking valves, etc. Many attempts have been made to remedy these difficulties either by removing the sludge-forming substances from the blended oils, or by keeping the blended oils under conditions unfavorable to the formation of sludge, or by the special selection of the component oils and their relative quantities.

It is the object of my invention to provide a simple, economic, and efficient method for producing blended oils, such as fuel oils, which are stable as regards the actual deposition of sludge, as well as the apparent sediment content, as indicated by the A. S. T. M. method D96–24. While it is known in the art that the blended oils (of the type of a fuel oil) produced by blending the heavy residues (particularly cracked petroleum residues) with lighter distillates at elevated temperatures, such as above 150° F., usually tend to precipitate sludge, which tendency is markedly favored by subjecting the blended oils to heating at elevated temperatures, and agitation, I have discovered that blending of the component oils at temperatures above 400° F., and preferably above 600° F., has a definite stabilizing effect on the sludge-producing substances in the oil. I have discovered that when low A. P. I. gravity residues (below 7° A. P. I.) such as those obtained by distillation of cracking of crude petroleum, or its distillates, or residues, or similar carbonaceous materials, are diluted while hot (above 400° F.) with lighter mineral oil distillates (such as lighter black oils, stove oil, gas oil, kerosene, naphtha, etc.), the resulting blended oils have relatively very slight tendency to deposit sludge, as compared to the oils of the same composition but prepared at temperatures below 400° F.

As a result of my discovery I am able to prepare high gravity (even above 10° A. P. I.) and low viscosity fuel oils by diluting very heavy deep cracked residues to the desired gravity and/or viscosity without danger of either precipitating sludge, while in storage or upon subsequent reheating of the blended oils, or producing a marked increase in their B. S. content as indicated by the A. S. T. M. test.

According to my invention, I blend the component oils and residues at temperatures above 400° F., and preferably above 600° F., but usually not exceding 950° F., and then cool and store, or otherwise dispose of the blended oil. Often it is convenient and economical to blend the components immediately after they are produced. For example, I prepared oils by blending a stove oil of a gravity A. P. I. about 31° and a bottom sediment not higher than 0.1 from storage with a hot cracked residue directly from the cracking unit, the blending temperature being maintained at about 850° F. The blended oil subsequently was distilled with steam to a proper flash point and then cooled; the sediment content showed no marked increase, as compared to that of the unblended cracked residue, even after prolonged heating at 190° F. accompanied by agitation.

In order to demonstrate further the effect of blending temperature upon the precipitation of sludge in the blended oils, the following data are tabulated:

	Component oils		Blended oils		
			After about 24 hours in storage at 190° F. with agitation for part of the time. Blended at—		
	Cracked residue	Stove oil	850° F.	350° F.	190° F.
Gravity, A. P. I.	5.0	31.0°	11.9	11.6	12.0
Viscosity, S. F. at 122° F.	706		19	20	31
B. S. & W.	0.1		0.15	3.2	4.0

The above data clearly show the beneficial effect of high temperature blending whenever a low content of sludge forming substances in the blended oil is desired. Although only the temperature of 850° F. is specifically given in the above example, I obtained very good results while blending the same and other oils at various temperatures above 400° F., and have observed that some of the blended oils were even further improved when blended at temperatures above 600° F.

It is understood, of course, that while employing the relatively high blending temperatures, it is desirable and often necessary to maintain the oils while blending under suitable pressures, in

order to avoid excessive vaporization. Ordinarily the pressures under 100 lbs./sq. in. are quite sufficient to effect condensation of the lighter component oils at the temperatures of blending, while higher pressures can be used without departing from the spirit of this invention.

Some means for a thorough mixing of the component oils may be provided either in the form of special stirring devices or by producing turbulent flow of the hot blended oil through a pipe or other conduit. It is not normally required to heat the blended oil for a prolonged period of time, it being necessary only to thoroughly mix the component oils and to produce a hot blended oil of uniform consistency.

Having fully described my invention, I do not intend to limit myself to any specific form or conditions of operation, or to any particular mineral oils and/or residues to be used in my process of blending, except as hereinbefore described and set forth in the appended claims.

I claim as my invention:

1. In the process of producing a blended sludge-stable fuel oil having a gravity above about 10° A. P. I. from a cracked substantially non-sludging residue having a gravity of less than about 7° A. P. I. and a stove oil, said residue and stove oil tending to precipitate sludge when blended at a temperature below 400° F., the steps of blending the two component oils at a temperature of about 850° F. and under a sufficient pressure substantially to prevent the separation of light oil components, said blending conditions of temperature and pressure being maintained for a sufficiently short time to prevent a substantial cracking of the oil components, and then cooling the mixture.

2. In the process of producing a blended sludge-stable fuel oil having a gravity above about 10° A. P. I. from a cracked substantially non-sludging residue having a gravity of less than about 7° A. P. I. and a stove oil, said residue containing light and heavy components, the steps of blending the residue and the stove oil at a temperature of about 850° F. and under a sufficient pressure substantially to prevent the separation of light oil components, said blending conditions of temperature and pressure being maintained for a sufficiently short time to prevent a substantial cracking of the oil components, subjecting the hot blended oil to steam distillation to remove light components, whereby a residual blended oil is produced having a gravity above about 10° A. P. I. and a proper flash and then cooling the residual oil.

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