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3,545,946

GELLED PETROLEUM DISTILLATE FUELS

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No Drawing. Filed May 1, 1968, Ser. No. 725,904
Int. Cl. C10I 7/02

U.S. Cl. 44—7

4 Claims

ABSTRACT OF THE DISCLOSURE

The present invention provides petroleum distillate fuel compositions comprising a petroleum distillate fuel having a paraffinic hydrocarbon gelling agent dispersed therein, which compositions are gelled at room temperature and liquid at elevated temperatures of about 55° C. The invention further provides a method for producing the above-described petroleum distillate fuel compositions, comprising the steps of: (1) dispersing the above-described gelling agent in the petroleum distillate fuel, (2) warming the resulting mixture at elevated temperatures to form a gellable fuel dispersion and (3) cooling the fuel dispersion.

The present invention relates to gelled petroleum distillate fuel oils and to a method of producing the same.

In the practical use of fuel oil it is desirable in some cases for safety reasons to be able to store it in a solid form. This is particularly true, for example, in the case of aviation jet fuel which is utilized in both military and civilian aircraft applications. The rupturing of fuel tanks in jet aircraft in crashes during landing and take off and the resulting spreading of the highly flammable fuel around the aircraft, into the passenger compartment and over surrounding dwellings and service structures has cost numerous lives which might have been saved had the fuel remained solid or gelled and confined and hence less subject to the spreading of fire. Hence, the development of a solid or semisolid fuel which does not flow except under certain extraordinary environmental conditions has been and continues to be an important problem.

It is, therefore, an object of the present invention to provide a fuel composition for jet aircraft which is a gel or nonflowing semisolid under normal storage conditions, but which is readily convertible to a free-flowing conventional fuel under easily reproducible, but atypical conditions of elevated temperature.

According to the present invention, there is provided a petroleum distillate fuel composition comprising:

(a) From about 75 to about 95 weight percent of a petroleum distillate fuel having a boiling point of from about 250 to about 750° F.; and

(b) From about 5 to about 25 weight percent of a paraffinic hydrocarbon gelling agent containing from about 25 to about 35 carbon atoms per molecule and melting in the range of from about 140° F. to about 155° F.

The invention further provides a method for preparing the above-described petroleum distillate fuel compositions which method comprises the steps of:

(a) Dispersing a gelling agent of the type described above in the petroleum distillate fuel at a temperature of from about 110 to about 150° F. thus forming a petroleum distillate fuel dispersion in liquid or fluid form; and

(b) Subsequently cooling the petroleum distillate fuel dispersion to a temperature below about 100° F.

The petroleum distillate fuels in which the gelling agents of this invention can be used to produce the gelled compositions which will be described in more detail below include aviation turbo-jet fuels and kerosenes suitable for use in jet engines. Such aviation turbo-jet fuels normally

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boil between about 250 and about 550° F. and are used in both military and civilian aircraft. Kerosenes suitable for treatment in accordance with this invention will normally have boiling points of between about 300 and 750° F. and are generally referred to as No. 1 and No. 2 fuel oils.

Apparently the particular manner in which the gelling agents of this invention are manufactured has no influence on their peculiarly valuable gelling properties. Methods for manufacturing the paraffinic gelling agents of this invention are well known in the art and need not be detailed herein.

EXAMPLE

Ten thousand parts of "JP—4" jet fuel are warmed carefully to a temperature of 140° F. Into this warm jet fuel are poured, slowly and with stirring, one thousand parts of a molten (165° F.) paraffin hydrocarbon having an average of 30 carbon atoms per molecule. This is n-triacontane. The resulting mixture is then stirred for an additional 20 minutes while its temperature is maintained within the range of 140–150° F. Upon cooling to ambient room temperature, the mixture is observed to gel to such an extent that it cannot be simply poured readily from an inverted open container.

In a manner similar to that of the foregoing example, any of the gelled fuel compositions of this invention can be manufactured. Although it is preferred that the paraffinic gelling agent be melted when it is initially introduced into the petroleum distillate fuel (which in turn is preferably warm at this time), these gelled fuel compositions can also be made by simply blending the petroleum distillate fuel and the gelling agent (or mixture of them) together, for example by stirring into the fuel the gelling agent(s) in particulated form, and subsequently warming the resulting blend to thereby form the desired composition (that gells or "sets up" when it is cooled to below about 100° F.). Generally, satisfactory gellable compositions can be made if the gelling agent is simply (a) dispersed fairly uniformly, (b) at a sufficiently high temperature to "melt" the gelling agent into the fuel composition, apparently no minimum amount of time being required if these elements are observed.

This gelled fuel in an aircraft fuel tank may be heated locally (near the fuel outlet of the tank) as fuel is needed for the engines.

It is of considerable import that the gelled fuel compositions of this invention are extremely resistant to loss of gelling properties when they are subjected to cycling exposure to conditions of freezing and "thawing," such as those that they might be expected to encounter in actual aircraft use. Thus, when the composition of Example 1 is cycled three times through the cycle:

(a) Freeze at 0° F. for 16 hours;

(b) Warm to 76° F. and hold at this temperature for 8 hours;

No loss in the stability of the gelled composition is observed.

The invention has been described in detail with particular reference to preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention as described hereinabove and as defined in the appended claims.

We claim:

1. A gelable petroleum distillate fuel composition comprising:

(a) from about 75 to about 95 weight percent of a petroleum distillate fuel having a boiling point of from about 140° F. to about 155° F.;

(b) from about 5 to about 25 weight percent of a paraffinic hydrocarbon gelling agent containing an

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average of from about 25 to about 35 carbon atoms per molecule and having a melting point within the range of from about 140° F. to about 155° F.

2. A gellable petroleum distillate fuel composition as in claim 1 wherein said gelling agent is n-triacontane.

3. A gellable petroleum distillate fuel composition as in claim 1, wherein said fuel is jet fuel boiling within the range of from about 250° F. and about 550° F.

4. A method for producing a gelled petroleum distillate fuel comprising the steps of:

(a) dispersing in a petroleum distillate fuel, which boils within the range of from about 250° F. to about 750° F., from about 5 to about 25 weight percent of a paraffinic hydrocarbon gelling agent which contains an average of from about 25 to about 35 carbon atoms per molecule and melts within the range of from about 140° F. to about 1550 F.;

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(b) warming the resulting dispersion at a temperature of from about 110 to about 150° F. to form a petroleum distillate fuel dispersion; and

(c) cooling said petroleum distillate fuel dispersion to a temperature below about 100° F.

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