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(54) BLENDS FOR USE IN FUEL COMPOSITIONS

MISCHUNGEN ZUR VERWENDUNG IN BRENNSTOFFZUSAMMENSETZUNGEN

MÉLANGES DESTINÉS À ÊTRE UTILISÉS DANS DES COMPOSITIONS DE CARBURANT

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US-A- 4 009 119 **US-A- 4 713 087**

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Description

[0001] The present invention relates to a blend of a fuel additive mixture and one or more solvents. It also relates to a fuel composition comprising a base fuel, particularly a gas oil, such as an automotive gas oil, and such a blend.

[0002] It is known to include in a fuel composition a number of additive components, which impart various performance or handling advantages to the fuel composition. Such components are commonly provided and used in the form of an additive mixture containing one or more of said components and one or more solvents. Said solvents provide one or more functions to the mixtures, for example to reduce the concentration of an additive component to a level at which it is safe to handle, or to dissolve an additive component that exhibits low solubility in hydrocarbons, or for other reasons.

[0003] It has been found that certain commercially available products, that are marketed for use as solvents, have the properties that are required, but that it can be desirable, for cost or availability reasons, to find alternative materials that are suitable solvents for use in this context.

[0004] It has now been found that the solvency properties of a commercially available solvent can be provided by a base fuel such as an automotive gas oil (diesel) or a jet fuel. In particular, it has been found that solvency properties of such a commercially available solvent when used in a blend containing a fuel additive mixture which comprises an anti-foam agent can be provided by at least partially replacing said solvent by a base fuel such as an automotive gas oil or jet fuel, each having a low aromatics content, when also including in said blend an alkyl alcohol. This enables such blends to maintain good stability even when using materials that are cheaper and more widely available than commercially available solvents.

[0005] For example, it has been found that the stability of a blend of a fuel additive mixture and 'Caromax 20' aromatic solvent (available ex. Petrochem Carless) can be provided when replacing at least some of said solvent in said blend by a low aromatics automotive gas oil and including in said blend 2-ethylhexanol.

[0006] EP-A-0 859 040 describes a fuel additive composition containing colloidally dispersed metals and conventional antifoam agents to which the addition of a lubricity additive is found to reduce foaming. Various solvents for the composition are proposed including white spirit, kerosene, alcohols, aromatic solvents, cetane improvers, and the fuel itself.

[0007] US-A-5385588 describes an additive concentrate package having an enhanced shelf-life stability which comprises a solvent stabiliser composition that contains at least one liquid aromatic hydrocarbon solvent and at least one liquid alkyl or cycloalkyl alcohol, e.g. 2-ethylhexanol. Preferred aromatic hydrocarbon solvents are described as being selected from toluene, ethylbenzene, xylene, and mixtures of o-, p- and m-xylenes, mesitylene, and higher boiling aromatic mixtures such as 'Super High Flash Naphtha', Aromatic 150' and 'Aromatic 100'. The aromatics contents of said commercially available higher boiling aromatic mixtures are >80%, >99vol% and >99vol%, respectively, i.e. high aromatics contents. However, there is no mention of the aromatic hydrocarbon solvent being a gas oil or jet fuel, nor of a low aromatics material. Solvents having low aromatics levels are known to be poor solvents for the types of additives in question.

[0008] Lack of stability of the blends can manifest itself as follows. As the atmospheric temperature falls, a blend that is a single-phase homogeneous liquid at normal temperatures may become a multiphase liquid as certain components either (i) freeze (forming a solid) or (ii) become immiscible in the bulk liquid and form a separate liquid layer. The onset of formation of a solid on cooling is characterised by a change in the transparency of the blend and the temperature at which this occurs is termed the "Cloud Point" of the fuel. If, on cooling, the Cloud Point is preceded by the formation of a separate liquid phase, the temperature at which this occurs is termed the "Phase separation temperature".

[0009] In accordance with the present invention there is provided a blend composition comprising (i) one or more base fuels having an aromatics content of below 80% by weight, said one or more base fuels being present in the amount of 10 to 95% by weight of the blend composition; (ii) a fuel additive mixture comprising one or more fuel additives, wherein said additives include a silicone-containing anti-foam agent, said fuel additive mixture being present preferably in the amount of 0.01 to 80% by weight of the blend composition; (iii) an alkyl alcohol which is selected from C_{7-20} alkyl alcohols and which is present in the amount of 0.01 to 30% by weight of the blend composition; and optionally (iv) an aromatic solvent having an aromatics content of greater than 80% by weight.

[0010] In particular, it has been found that additive packages or mixtures containing a silicone anti-foam agent, for example a polyether-modified polysiloxane, have a tendency especially at low temperature to deposit a separate liquid phase containing silicone, plus all other components present which have partitioned themselves between the low aromatics hydrocarbon solvent phase and the silicone phase, but that this separation does not occur if the solvent system contains alcohol in addition to the low aromatics hydrocarbon.

[0011] "Base fuel" is defined as being a material that is in accordance with one or more published base fuel standard specifications.

[0012] Preferably, said aromatic solvent has an aromatics content of greater than 85% by weight, more preferably greater than 90% by weight, most preferably greater than 95% by weight. Suitable such aromatic solvents include 'Caromax 20' (ex. Petrochem Carless) and 'Solvesso 200' (ex. ExxonMobil).

[0013] Preferably, each said base fuel has an aromatics content of below 50% by weight, more preferably below 35%

by weight. It is preferably selected from gas oils, such as automotive gas oils, and kerosene fuels, such as jet fuels.

[0014] Preferably, each said base fuel has a cloud point of below -5°C, more preferably below -15°C, yet more preferably below -20°C, most preferably below -25°C.

[0015] Preferably, said alkyl alcohol is selected from C_{7-10} alkyl alcohols, such as 2-ethylhexanol, octan-1-ol and octan-2-ol, and is most preferably 2-ethylhexanol.

[0016] Preferably, said one or more published base fuel standard specifications are selected from EN 590, Swedish Class 1 (as defined by the Swedish Standard for EC1), ASTM D975 and Defence Standard 91-91 (Def Stan 91-91) specifications. EN 590:2004 is the current European Standard for diesel fuels. SS 155435:2006 is the current Swedish Standard for EC1. ASTM D975-07a is the current United States Standard Specification for Diesel Fuel Oils. Def Stan 91-91 Issue 5 Amendment 2 is the current UK standard for Turbine Fuel, Aviation Kerosine Type, Jet A-1.

[0017] Preferably, the concentration of the fuel additive mixture in the blend composition accords with one or more of the following parameters:-

> (i) at least 10%; (ii) at least 20%; (iii) at least 30%; (iv) at least 40%; (v) up to 60%; (vi) up to 70%; by weight, with the range having features (i) and (vi) being preferred.

[0018] Preferably, the concentration of the anti-foam agent in the blend composition accords with one or more of the following parameters:-

> (i) at least 0.025%; (ii) at least 0.05%; (iii) at least 0.075%; (iv) at least 0.1%; (v) up to 2%; (vi) up to 2.5%; by weight, with the range having features (i) and (vi) being preferred.

[0019] Preferably, the concentration of the base fuel(s) in the blend composition accords with one or more of the following parameters:-

> (i) at least 10%; (ii) at least 20%; (iii) at least 30%; (iv) at least 50%; (v) up to 75%; (vi) up to 85%; by weight, with the range having features (i) and (vi) being preferred.

[0020] Preferably, the concentration of the aromatic solvent in the blend composition accords with one or more of the following parameters:-

> (i) 0%; (ii) at least 1%; (iii) at least 2%; (iv) at least 3%; (v) at least 5%; (vi) up to 10%; (vii) up to 15%; (viii) up to 35%; (ix) up to 50%; (x) up to 65%; by weight, with ranges having features (i) and (x), (ii) and (ix), (iii) and (viii), and (iv) and (vii) respectively being progressively more preferred. The ranges having features (i) and (ix), (i) and (viii), (ii) to (vii), and (i) are also preferred.

[0021] Preferably, the concentration of said alkyl alcohol in the blend composition accords with one or more of the following parameters:-

> (i) at least 0.01%; (ii) at least 1%; (iii) at least 5%; (iv) up to 15%; (v) up to 20%; (vi) up to 30%; by weight, with ranges having features (ii) and (v), and (iii) and (iv) respectively being progressively more preferred. The ranges having features (ii) and (vi), and (i) and (iv) are also preferred.

[0022] In accordance with the present invention, there is also provided a process for the preparation of a blend composition which process comprises blending (i) one or more base fuels having an aromatics content of below 80% by weight, said one or more base fuels being present in the amount of 10 to 95% by weight of the blend composition; (ii) a fuel additive mixture comprising one or more fuel additives, wherein said additives include a silicone-containing anti-foam agent, said fuel additive mixture being present preferably in the amount of 0.01 to 80% by weight of the blend composition; (iii) an alkyl alcohol which is selected from C_{7-20} alkyl alcohols, in the amount of 0.01 to 30% by weight of the blend composition; and optionally (iv) an aromatic solvent having an aromatics content of greater than 80% by weight.

[0023] In accordance with the present invention there is further provided a fuel composition comprising a second base fuel and a blend composition according to the present invention, wherein said second base fuel may the same as or different from the base fuel in said blend composition. Said second base fuel is preferably a gas oil, more preferably an automotive gas oil (diesel).

[0024] Preferably, said anti-foam agent is a polyether-modified polysiloxane.

[0025] The "fuel additive mixture comprising one or more fuel additives" is defined as being a mixture of additives in which the (active matter) concentration of said additives is greater than 10000ppmw, preferably greater than 50000ppmw, more preferably greater than 100000ppmw, most preferably greater than 150000ppmw. Said fuel additive mixture, and the blend composition of the present invention which comprises said fuel additive mixture, may in practice each be termed a "fuel additive package".

[0026] The fuel composition comprising said blend composition will typically contain a major proportion of the second base fuel, such as from 50 to 99.95%v, preferably from 80 to 99.95%v, more preferably from 90 to 99.95%v.

[0027] The fuel compositions to which the present invention relates include diesel fuels for use in automotive compression ignition engines, as well as in other types of engine such as for example marine, railroad and stationary engines, and industrial gas oils for use in heating applications (e.g. boilers).

[0028] The base fuel may itself comprise a mixture of two or more different diesel fuel components, and/or be additivated as described below.

[0029] Such diesel fuels will contain one or more base fuels which may typically comprise liquid hydrocarbon middle distillate gas oil(s), for instance petroleum derived gas oils. Such fuels will typically have boiling points within the usual diesel range of 150 to 400°C, depending on grade and use. They will typically have a density from 750 to 1000 kg/m^3, preferably from 780 to 860 kg/m^3, at 15°C (e.g. ASTM D4502 or IP 365) and a cetane number (ASTM D613) of from 35 to 120, more preferably from 40 to 85. They will typically have an initial boiling point in the range 150 to 230°C and a final boiling point in the range 290 to 400°C. Their kinematic viscosity at 40°C (ASTM D445) might suitably be from 1.2 to 4.5 mm^2/s.

[0030] An example of a petroleum derived gas oil is a Swedish Class 1 base fuel, which will have a density from 800 to 820 kg/m^3 at 15°C (SS-EN ISO 3675, SS-EN ISO 12185), a T95 of 320°C or less (SS-EN ISO 3405) and a kinematic viscosity at 40°C (SS-EN ISO 3104) from 1.4 to 4.0 mm^2/s, as defined by the Swedish national specification EC1.

[0031] Such industrial gas oils will contain a base fuel which may comprise fuel fractions such as the kerosene or gas oil fractions obtained in traditional refinery processes, which upgrade crude petroleum feedstock to useful products. Preferably such fractions contain components having carbon numbers in the range 5 to 40, more preferably 5 to 31, yet more preferably 6 to 25, most preferably 9 to 25, and such fractions have a density at 15°C of 650 to 1000 kg/m^3, a kinematic viscosity at 20°C of 1 to 80 mm^2/s, and a boiling range of 150 to 400°C.

[0032] Kerosene fuels will typically have boiling points within the usual kerosene range of 130 to 300°C, depending on grade and use. They will typically have a density from 775 to 840 kg/m^3, preferably from 780 to 830 kg/m^3, at 15°C (e.g. ASTM D4502 or IP 365). They will typically have an initial boiling point in the range 130 to 160°C and a final boiling point in the range 220 to 300°C. Their kinematic viscosity at -20°C (ASTM D445) might suitably be from 1.2 to 8.0 mm^2/s.

[0033] Optionally, non-mineral oil based fuels, such as bio-fuels or Fischer-Tropsch derived fuels, may also form or be present in the fuel composition. Such Fischer-Tropsch fuels may for example be derived from natural gas, natural gas liquids, petroleum or shale oil, petroleum or shale oil processing residues, coal or biomass.

[0034] The amount of Fischer-Tropsch derived fuel used in a diesel fuel composition may be from 0% to 100%v of the overall diesel fuel composition, preferably from 5% to 100%v, more preferably from 5% to 75%v. It may be desirable for the composition to contain 10%v or greater, more preferably 20%v or greater, still more preferably 30%v or greater, of the Fischer-Tropsch derived fuel. It is particularly preferred for the composition to contain 30 to 75%v, and particularly 30 or 70%v, of the Fischer-Tropsch derived fuel. The balance of the fuel composition is made up of one or more other fuels.

[0035] An industrial gas oil composition will preferably comprise more than 50 wt%, more preferably more than 70 wt%, of a Fischer-Tropsch derived fuel component.

[0036] Such a Fischer-Tropsch derived fuel component is any fraction of the middle distillate fuel range, which can be isolated from the (optionally hydrocracked) Fischer-Tropsch synthesis product. Typical fractions will boil in the naphtha, kerosene or gas oil range. Preferably, a Fischer-Tropsch product boiling in the kerosene or gas oil range is used because these products are easier to handle in for example domestic environments. Such products will suitably comprise a fraction larger than 90 wt% which boils between 160 and 400°C, preferably to about 370°C. Examples of Fischer-Tropsch derived kerosene and gas oils are described in EP-A-0583836, WO-A-97/14768, WO-A-97/14769, WO-A-00/11116, WO-A-00/11117, WO-A-01/83406, WO-A-01/83648, WO-A-01/83647, WO-A-01/83641, WO-A-00/20535, WO-A-00/20534, EP-A-1101813, US-A-5766274, US-A-5378348, US-A-5888376 and US-A-6204426.

[0037] The Fischer-Tropsch product will suitably contain more than 80 wt% and more suitably more than 95 wt% iso and normal paraffins and less than 1 wt% aromatics, the balance being naphthenics compounds. The content of sulphur and nitrogen will be very low and normally below the detection limits for such compounds. For this reason the sulphur content of a fuel composition containing a Fischer-Tropsch product may be very low.

[0038] The fuel composition preferably contains no more than 5000ppmw sulphur, more preferably no more than 500ppmw, or no more than 350ppmw, or no more than 150ppmw, or no more than 100ppmw, or no more than 70ppmw, or no more than 50ppmw, or no more than 30ppmw, or no more than 20ppmw, or most preferably no more than 15ppmw sulphur.

[0039] The base fuel may itself be additivated (additive-containing) or unadditivated (additive-free). If additivated, e.g. at the refinery, it will contain minor amounts of one or more additives selected for example from anti-static agents, pipeline drag reducers, flow improvers (e.g. ethylene/vinyl acetate copolymers or acrylate/maleic anhydride copolymers), lubricity additives, antioxidants and wax anti-settling agents.

[0040] The fuel additives that also may be included in the fuel additive mixture comprised in the blend composition according to the present invention are discussed below, with reference to their inclusion in fuel compositions comprising such blend compositions.

[0041] Detergent-containing diesel fuel additives are known and commercially available. Such additives may be added to diesel fuels at levels intended to reduce, remove, or slow the build up of engine deposits.

[0042] Examples of detergents suitable for use in fuel additives for the present purpose include polyolefin substituted succinimides or succinamides of polyamines, for instance polyisobutylene succinimides or polyisobutylene amine succinamides, aliphatic amines, Mannich bases or amines and polyolefin (e.g. polyisobutylene) maleic anhydrides. Succinimide dispersant additives are described for example in GB-A-960493, EP-A-0147240, EP-A-0482253, EP-A-0613938, EP-A-0557516 and WO-A-98/42808. Particularly preferred are polyolefin substituted succinimides such as polyisobutylene succinimides.

[0043] The fuel additive mixture may contain other components, examples being lubricity enhancers; dehazers, (e.g. alkoxylated phenol formaldehyde polymers); ignition improvers (cetane improvers) (e.g. 2-ethylhexyl nitrate (EHN), cyclohexyl nitrate, di-tert-butyl peroxide and those disclosed in US-A-4208190 at column 2, line 27 to column 3, line 21); anti-rust agents (e.g. a propane-1,2-diol semi-ester of tetrapropenyl succinic acid, or polyhydric alcohol esters of a succinic acid derivative, the succinic acid derivative having on at least one of its alpha-carbon atoms an unsubstituted or substituted aliphatic hydrocarbon group containing from 20 to 500 carbon atoms, e.g. the pentaerythritol diester of polyisobutylene-substituted succinic acid); corrosion inhibitors; reodorants; anti-wear additives; anti-oxidants (e.g. phenolics such as 2,6-di-tert-butylphenol, or phenylenediamines such as N,N'-di-sec-butyl-p-phenylenediamine); metal deactivators; combustion improvers; cold flow improvers; and wax anti-settling agents.

[0044] The fuel additive mixture may contain a lubricity enhancer, especially when the fuel composition has a low (e.g. 500 ppmw or less) sulphur content. In the additivated fuel composition, the lubricity enhancer is conveniently present at a concentration of less than 1000 ppmw, preferably between 50 and 1000 ppmw, more preferably between 70 and 1000 ppmw. Suitable commercially available lubricity enhancers include ester-and acid-based additives. Other lubricity enhancers are described in the patent literature, in particular in connection with their use in low sulphur content diesel fuels, for example in:

- the paper by Danping Wei and H.A. Spikes, "The Lubricity of Diesel Fuels", Wear, III (1986) 217-235;
- WO-A-95/33805 - cold flow improvers to enhance lubricity of low sulphur fuels;
- WO-A-94/17160 - certain esters of a carboxylic acid and an alcohol wherein the acid has from 2 to 50 carbon atoms and the alcohol has 1 or more carbon atoms, particularly glycerol monooleate and di-isodecyl adipate, as fuel additives for wear reduction in a diesel engine injection system;
- US-A-5490864 - certain dithiophosphoric diester-dialcohols as anti-wear lubricity additives for low sulphur diesel fuels; and
- WO-A-98/01516 - certain alkyl aromatic compounds having at least one carboxyl group attached to their aromatic nuclei, to confer anti-wear lubricity effects particularly in low sulphur diesel fuels.

[0045] It is also preferred that the fuel additive mixture contain an anti-foam agent in combination with an anti-rust agent and/or a corrosion inhibitor and/or a lubricity additive.

[0046] Unless otherwise stated, the (active matter) concentration of each such additive component in the additivated fuel composition is preferably up to 10000 ppmw, more preferably in the range from 0.1 to 1000 ppmw, advantageously from 0.1 to 300 ppmw, such as from 0.1 to 150 ppmw.

[0047] The (active matter) concentration of any anti-foam agent in the fuel composition will preferably be in the range from 0.1 to 20 ppmw, more preferably from 0.25 to 15 ppmw, still more preferably from 0.5 to 10 ppmw, advantageously from 1 to 5 ppmw. The (active matter) concentration of any dehazer in the fuel composition will preferably be in the range from 0.1 to 20 ppmw, more preferably from 1 to 15 ppmw, still more preferably from 1 to 10 ppmw, advantageously from 1 to 5 ppmw. The (active matter) concentration of any ignition improver present will preferably be 2600 ppmw or less, more preferably 2000 ppmw or less, conveniently from 300 to 1500 ppmw. The (active matter) concentration of any detergent in the fuel composition will preferably be in the range from 5 to 1500 ppmw, more preferably from 10 to 750 ppmw, most preferably from 20 to 500 ppmw. The (active matter) concentration of any cold flow improver or wax anti-settling agent in the fuel composition will preferably be in the range from 15 to 750 ppmw, more preferably from 25 to 500 ppmw, most preferably from 25 to 300 ppmw.

[0048] In the case of a diesel fuel composition, for example, the fuel additive mixture will typically contain a detergent, optionally together with other components as described above, and a diesel fuel-compatible diluent, which may be a mineral oil, a solvent such as those sold by Shell companies under the trade mark "SHELLSOL", a polar solvent such as an ester and, in particular, an alcohol, e.g. hexanol, 2-ethylhexanol, decanol, isotridecanol and alcohol mixtures such as those sold by Shell companies under the trade mark "LINEVOL", especially LINEVOL 79 alcohol which is a mixture of C_{7-9} primary alcohols, or a C_{12-14} alcohol mixture which is commercially available.

[0049] The total content of the additives in the fuel composition may be suitably between 0 and 10000 ppmw and preferably below 5000 ppmw.

[0050] In this specification, amounts (concentrations, %v, ppmw, wt%) of components are of active matter, i.e. exclusive of volatile solvents/diluent materials.

[0051] The present invention is particularly applicable where the fuel composition is used or intended to be used in a direct injection diesel engine, for example of the rotary pump, in-line pump, unit pump, electronic unit injector or common rail type, or in an indirect injection diesel engine. The fuel composition may be suitable for use in heavy and/or light duty diesel engines.

[0052] As mentioned above, it is also applicable where the fuel composition is used in heating applications, for example boilers. Such boilers include standard boilers, low temperature boilers and condensing boilers, and are typically used for heating water for commercial or domestic applications such as space heating and water heating.

[0053] The present invention may lead to any of a number of advantages, including the ability to reduce solvent cost and/or reduce constraints on availability of solvent, whilst maintaining the same storage stability, or achieve increased storage stability whilst maintaining the same cost and/or same constraints on availability of solvent.

[0054] The present invention will now be further described by reference to the following Examples, in which, unless otherwise indicated, parts and percentages are by weight, and temperatures are in degrees Celsius:

[0055] Blends were prepared from the following components:-

A Fuel additive mixture containing a number of fuel additive components, including an anti-foam agent;
B ’Caromax 20’ aromatic solvent, aromatics content >99% (available ex. Petrochem Carless);
C 2-ethylhexanol (available ex. Aldrich);
D Norwegian Winter Diesel (ex. Shell); and
E Swedish Class 1 Diesel (ex. Shell)

<u>Examples</u>

[0056] Component D (in accordance with EN590), used in preparing the blends, had the properties given in Table 1:

<u>Table 1</u>

Fuel property	Test method	Component D
Density @ 15°C (kg/m^3)	IP 365/ ASTM D4052	824.5
Distillation (°C) :	IP 123/ ASTM D86	
IBP		173
5%		190
10%		194
30%		211
50%		229
65%		245
75%		259
85%		280
90%		296
95%		322
FBP		332
Cetane index	IP 498 [IQT]	47.1
Kinematic viscosity @ 40°C (mm^2/s)	IP 71/ ASTM D445	2.0
Cloud point (°C)	IP 219	-29
CFPP (°C)	IP 309	-39

(continued)

Fuel property	Test method	Component D
Sulphur (mg/kg)	ASTM D2622	below 10
Flash point (°C)	IP 34	greater than 55
Aromatics, %m	IP 391	approx. 24

[0057] Component E, used in preparing the blends, was in accordance with Swedish national specification EC1, the requirements of which are given in Table 2:

Table 2

Fuel property	Requirement	Test method
Cetane Index (min)	50	SS-EN ISO 4264
Cetane No.(min)	51	SS-EN ISO 5165
Density @ 15°C (kg/m^3)	800 - 820	SS-EN ISO 3675 SS-EN ISO 12185
Aromatics (%v/v) (max)	5	SS 155116 SS-EN 12916
PAH (%v/v) (max)	0.02	SS 155116
Sulphur (mg/kg) (max)	10	SS-EN ISO 20846 SS-EN ISO 20847 SS-EN ISO 20884
Flash point (°C) (min)	56	SS-EN ISO 2719
Viscosity @ 40°C (mm^2/s)	1.4 - 4.0	SS-EN ISO 3104
IBP (°C) (min)	180	SS-EN ISO 3405
T95 (°C) (max)	320	SS-EN ISO 3405
CFPP (°C) (max) Summer Winter	 -10 -26	SS-EN 116
Cloud point (°C) (max) Summer Winter	 0 -16	SS-EN 23015

[0058] Stability testing was conducted by placing the blend sample in a glass container and then placing the container in a temperature-controlled cabinet. The temperature within the cabinet was then set to the required level and a record made of the time of the start of the test. A rating of the stability of the blend was performed by visual inspection of when the blend separated into two phases. The time at which this occurred was recorded, and the length of time before phase separation could therefore be calculated.

[0059] The separation of the blend into two phases had the visual appearance of a small amount of separated material at the bottom of the container, or in suspension.

[0060] In Table 3 are set out a number of blends that were tested at -20°C. Each blend contained 19.5% of Component A. The fuel used was Component D. In respect of each blend is shown the length of time before phase separation:

Table 3

Component B	Component C	Component D	Maximum length of stability (days)
15%	0%	65.5%	9
30%	0%	50.5%	9

(continued)

Component B	Component C	Component D	Maximum length of stability (days)
45%	0%	35.5%	15
60%	0%	20.5%	≥95*
15%	3.33%	62.17%	27
22.5%	3.33%	54.67%	≥83*
30%	3.33%	47.17%	≥100*
45%	3.33%	32.17%	≥100*
60%	3.33%	17.17%	≥100*
0%	6.67%	73.8%	56
15%	6.67%	58.83%	≥116*
30%	6.67%	43.83%	≥101*
45%	6.67%	28.83%	≥101*
60%	6.67%	13.83%	≥101*
0%	10%	70.5%	≥83*
15%	10%	55.5%	≥112*
30%	10%	40.5%	≥112*
45%	10%	25.5%	≥112*
60%	10%	10.5%	≥112*
* Blend still stable when testing terminated			

[0061] It is shown in Table 3 that at a particular concentration of Component B, the maximum length of storage stability could be increased as the concentration of Component C increased. For example, at 15% of Component B, the maximum length of storage stability increased from 9 to 27 to ≥116 days when the concentration of Component C was increased from 0% to 3.33% to 6.67%.

[0062] As shown in Table 3, at each level of Component C, the total concentration of Components B and D remained constant as the level of Component B was varied with the level of Component C remaining constant. It can be seen that in the case of the blends that contained no Component C, as Component B was replaced by Component D, the maximum length of storage stability reduced. However, in the case of the blends that did contain Component C, there was more constancy in the maximum length of storage stability as Component B was replaced by Component D.

[0063] In Table 4 are set out a number of blends that were tested at -20°C. Each blend contained 19.5% of Component A. The fuel used was a 3:1 blend of Component D and Component E. In respect of each blend is shown the length of time before phase separation:

Table 4

Component B	Component C	Component D/E	Maximum length of stability (days)
15%	0%	65.5%	9
30%	0%	50.5%	9
45%	0%	35.5%	15
60%	0%	20.5%	≥103*

(continued)

Component B	Component C	Component D/E	Maximum length of stability (days)
15%	3.33%	62.17%	27
22.5%	3.33%	54.67%	≥62*
30%	3.33%	47.17%	≥100*
45%	3.33%	32.17%	≥100*
60%	3.33%	17.17%	≥100*
0%	6.67%	73.8%	14
15%	6.67%	58.83%	≥116*
30%	6.67%	43.83%	≥101*
45%	6.67%	28.83%	≥101*
60%	6.67%	13.83%	≥101*
0%	10%	70.5%	≥62*
15%	10%	55.5%	≥118*
30%	10%	40.5%	≥103*
45%	10%	25.5%	≥103*
60%	10%	10.5%	≥103*
* Blend still stable when testing terminated			

[0064] It is shown in Table 4 that at a particular concentration of Component B, the maximum length of storage stability could be increased as the concentration of Component C increased. For example, at 15% of Component B, the maximum length of storage stability increased from 9 to 27 to ≥116 days when the concentration of Component C was increased from 0% to 3.33% to 6.67%.

[0065] As shown in Table 4, at each level of Component C, the total concentration of Components B and D/E remained constant as the level of Component B was varied with the level of Component C remaining constant. It can be seen that in the case of the blends that contained no Component C, as Component B was replaced by Component D, the maximum length of storage stability reduced. However, in the case of the blends that did contain Component C, there was more constancy in the maximum length of storage stability as Component B was replaced by Component D.

[0066] In Table 5 are set out a number of blends that were tested at -20°C. Each blend contained 19.5% of Component A. The fuel used was a 1:1 blend of Component D and Component E. In respect of each blend is shown the length of time before phase separation:

Table 5

Component B	Component C	Component D/E	Maximum length of stability (days)
15%	0%	65.5%	-
30%	0%	50.5%	9
45%	0%	35.5%	40
60%	0%	20.5%	≥95*
15%	3.33%	62.17%	-
22.5%	3.33%	54.67%	20
30%	3.33%	47.17%	45

(continued)

Component B	Component C	Component D/E	Maximum length of stability (days)
45%	3.33%	32.17%	≥100*
60%	3.33%	17.17%	≥100*
0%	6.67%	73.8%	14
15%	6.67%	58.83%	≥116*
30%	6.67%	43.83%	≥101*
45%	6.67%	28.83%	≥101*
60%	6.67%	13.83%	≥101*
0%	10%	70.5%	14
15%	10%	55.5%	≥118*
30%	10%	40.5%	≥103*
45%	10%	25.5%	≥103*
60%	10%	10.5%	≥103*
* Blend still stable when testing terminated			

[0067] It is shown in Table 5 that at a particular concentration of Component B, the maximum length of storage stability could be increased as the concentration of Component C increased. For example, at 30% of Component B, the maximum length of storage stability increased from 9 to 45 to ≥101 days when the concentration of Component C was increased from 0% to 3.33% to 6.67%.

[0068] As shown in Table 5, at each level of Component C, the total concentration of Components B and D/E remained constant as the level of Component B was varied with the level of Component C remaining constant. It can be seen that in the case of the blends that contained no Component C, as Component B was replaced by Component D/E, the maximum length of storage stability reduced. However, in the case of the blends that did contain Component C, there was more constancy in the maximum length of storage stability as Component B was replaced by Component D/E.

[0069] It can also be seen that, taking the figures in Table 3 as an example, that in the absence of Component C, it was necessary to include 60% of Component B in order to achieve storage stability for 60 days. However, when including 3.33%, 6.67% and 10% of Component C, the concentration of Component B could be reduced to 22.5%, 15% and 0% respectively, with a corresponding increase to 54.67%, 58.83% and 70.5% of Component A respectively, in order to achieve storage stability for 60 days.

[0070] Thus, the blend compositions of the present invention enable the aromatic solvent to be replaced, at least in part, by the base fuel, and yet still achieve a required blend storage stability.

[0071] Although all of the tests in the above Examples were performed at -20°C, it is stressed that they could also be performed at other relevant temperatures.

Claims

1. A blend composition comprising (i) one or more base fuels having an aromatics content of below 80% by weight, said one or more base fuels being present in the amount of 10 to 95% by weight of the blend composition; (ii) a fuel additive mixture comprising one or more fuel additives, wherein said additives include a silicone-containing anti-foam agent; (iii) an alkyl alcohol which is selected from C_{7-20} alkyl alcohols and which is present in the amount of 0.01 to 30% by weight of the blend composition; and optionally (iv) an aromatic solvent having an aromatics content of greater than 80% by weight.

2. A blend composition according to claim 1, wherein said fuel additive mixture is present in the amount of 0.01 to 80% by weight of the blend composition.

3. A blend composition according to claim 1 or claim 2, wherein said aromatic solvent has an aromatics content of greater than 85% by weight.

4. A blend composition according to claim 3, wherein said aromatics content is greater than 90% by weight.

5. A blend composition according to claim 4, wherein said aromatics content is greater than 95% by weight.

6. A blend composition according to any one of the preceding claims, wherein each said base fuel has an aromatics content of below 50% by weight.

7. A blend composition according to claim 6, wherein said aromatics content is below 35% by weight.

8. A blend composition according to claim 6 or claim 7, wherein each said base fuel is selected from gas oils and kerosene fuels.

9. A blend composition according to any one of the preceding claims, wherein said alkyl alcohol is selected from C_{7-10} alkyl alcohols.

10. A blend composition according to claim 9, wherein said alkyl alcohol is 2-ethylhexanol.

11. A blend composition according to any one of the preceding claims, which comprises said base fuel(s) in the amount of 10 to 85% by weight of said composition.

12. A blend composition according to any one of the preceding claims, which comprises said aromatic solvent in the amount of 0 to 65% by weight of said composition.

13. A process for the preparation of a blend composition which process comprises blending (i) one or more base fuels having an aromatics content of below 80% by weight, said one or more base fuels being present in the amount of 10 to 95% by weight of the blend composition; (ii) a fuel additive mixture comprising one or more fuel additives, wherein said additives include a silicone-containing anti-foam agent; (iii) an alkyl alcohol which is selected from C_{7-20} alkyl alcohols, in the amount of 0.01 to 30% by weight of the blend composition; and optionally (iv) an aromatic solvent having an aromatics content of greater than 80% by weight.

14. A fuel composition comprising a second base fuel and a blend composition according to any one of claims 1 to 12, wherein said second base fuel may the same as or different from the base fuel in said blend composition.

15. A blend composition, process or fuel composition according to any one of the preceding claims, wherein said anti-foam agent comprises a polyether-modified polysiloxane.

Patentansprüche

1. Mischungszusammensetzung, umfassend (i) einen oder mehrere Grundbrennstoffe mit einem Gehalt an Aromaten von unter 80 Gew.-%, wobei der eine oder die mehreren Grundbrennstoffe in einer Menge von 10 bis 95 Gew.-% der Mischungszusammensetzung vorhanden sind; (ii) ein Brennstoffzusatzstoffgemisch, umfassend einen oder mehrere Brennstoffzusatzstoffe, wobei die Zusatzstoffe ein siliconhaltiges Antischaummittel enthalten; (iii) einen Alkylalkohol, der ausgewählt ist aus C_{7-20}-Alkylalkoholen und der in einer Menge von 0,01 bis 30 Gew.-% der Mischungszusammensetzung vorhanden ist; und gegebenenfalls (iv) ein aromatisches Lösungsmittel mit einem Gehalt an Aromaten von größer als 80 Gew.-%.

2. Mischungszusammensetzung gemäß Anspruch 1, wobei das Brennstoffzusatzstoffgemisch in einer Menge von 0,01 bis 80 Gew.-% der Mischungszusammensetzung vorhanden ist.

3. Mischungszusammensetzung gemäß Anspruch 1 oder Anspruch 2, wobei das aromatische Lösungsmittel einen Gehalt an Aromaten von größer als 85 Gew.-% aufweist.

4. Mischungszusammensetzung gemäß Anspruch 3, wobei der Gehalt an Aromaten größer als 90 Gew.-% ist.

5. Mischungszusammensetzung gemäß Anspruch 4, wobei der Gehalt an Aromaten größer als 95 Gew.-% ist.

6. Mischungszusammensetzung gemäß einem der vorstehenden Ansprüche, wobei jeder der Grundbrennstoffe einen Gehalt an Aromaten von unter 50 Gew.-% aufweist.

7. Mischungszusammensetzung gemäß Anspruch 6, wobei der Gehalt an Aromaten unter 35 Gew.-% beträgt.

8. Mischungszusammensetzung gemäß Anspruch 6 oder Anspruch 7, wobei jeder der Grundbrennstoffe ausgewählt ist aus Gasölen und Kerosinbrennstoffen.

9. Mischungszusammensetzung gemäß einem der vorstehenden Ansprüche, wobei der Alkylalkohol ausgewählt ist aus C_{7-10}-Alkylalkoholen.

10. Mischungszusammensetzung gemäß Anspruch 9, wobei der Alkylalkohol 2-Ethylhexanol ist.

11. Mischungszusammensetzung gemäß einem der vorstehenden Ansprüche, umfassend das/die Grundöl(e) in einer Menge von 10 bis 85 Gew.-% der Zusammensetzung.

12. Mischungszusammensetzung gemäß einem der vorstehenden Ansprüche, umfassend das aromatische Lösungsmittel in einer Menge von 0 bis 65 Gew.-% der Zusammensetzung.

13. Verfahren zum Herstellen einer Mischungszusammensetzung, welches Verfahren umfasst: Mischen von (i) einem oder mehreren Grundbrennstoffen mit einem Gehalt an Aromaten von unter 80 Gew.-%, wobei der eine oder die mehreren Grundbrennstoffe in einer Menge von 10 bis 95 Gew.-% der Mischungszusammensetzung vorhanden sind; (ii) einem Brennstoffzusatzstoffgemisch, umfassend einen oder mehrere Brennstoffzusatzstoffe, wobei die Zusatzstoffe ein siliconhaltiges Antischaummittel enthalten; (iii) einem Alkylalkohol, der ausgewählt ist aus C_{7-20}-Alkylalkoholen, in einer Menge von 0,01 bis 30 Gew.-% der Mischungszusammensetzung; und gegebenenfalls (iv) einem aromatischen Lösungsmittel mit einem Gehalt an Aromaten von größer als 80 Gew.-%.

14. Brennstoffzusammensetzung, umfassend einen zweiten Grundbrennstoff und eine Mischungszusammensetzung gemäß einem der Ansprüche 1 bis 12, wobei der zweite Grundbrennstoff der gleiche sein kann wie der Grundbrennstoff in der Mischungszusammensetzung oder davon verschieden.

15. Mischungszusammensetzung, Verfahren oder Brennstoffzusammensetzung gemäß einem der vorstehenden Ansprüche, wobei das Antischaummittel ein Polyether-modifiziertes Polysiloxan umfasst.

Revendications

1. Composition de mélange comprenant

(i) un ou plusieurs carburants de base ayant une teneur en composés aromatiques au-dessous de 80 % en poids, ledit ou lesdits carburants de base étant présents à hauteur de 10 à 95 % en poids de la composition de mélange ;
(ii) un mélange d'additifs pour carburant comprenant un ou plusieurs additifs pour carburant, lesdits additifs comprenant un agent antimousse contenant de la silicone ;
(iii) un alcool alkylique qui est choisi parmi les alcools alkyliques en C_{17-20} et qui est présent à hauteur de 0,01 à 30 % en poids de la composition de mélange ; et éventuellement
(iv) un solvant aromatique ayant une teneur en composés aromatiques supérieure à 80 % en poids.

2. Composition de mélange selon la revendication 1, dans laquelle ledit mélange d'additifs pour carburant est présent à hauteur de 0,01 à 80 % en poids de la composition de mélange.

3. Composition de mélange selon la revendication 1 ou la revendication 2, dans laquelle ledit solvant aromatique a une teneur en composés aromatiques supérieure à 85 % en poids.

4. Composition de mélange selon la revendication 3, dans laquelle ladite teneur en composés aromatiques est supérieure à 90 % en poids.

5. Composition de mélange selon la revendication 4, dans laquelle ladite teneur en composés aromatiques est supérieure à 95 % en poids.

6. Composition de mélange selon l'une quelconque des revendications précédentes, dans laquelle chacun desdits carburants de base a une teneur en composés aromatiques au-dessous de 50 % en poids.

7. Composition de mélange selon la revendication 6, dans laquelle ladite teneur en composés aromatiques est au-dessous de 35 % en poids.

8. Composition de mélange selon la revendication 6 ou la revendication 7, dans laquelle chacun desdits carburants de base est choisi parmi les gazoles et les carburants kérosènes.

9. Composition de mélange selon l'une quelconque des revendications précédentes, dans laquelle ledit alcool alkylique est choisi parmi les alcools alkyliques en C_{7-10}.

10. Composition de mélange selon la revendication 9, dans laquelle ledit alcool alkylique est le 2-éthylhexanol.

11. Composition de mélange selon l'une quelconque des revendications précédentes, qui comprend ledit ou lesdits carburants de base à hauteur de 10 à 85 % en poids de ladite composition.

12. Composition de mélange selon l'une quelconque des revendications précédentes, qui comprend ledit solvant aromatique à hauteur de 0 à 65 % en poids de ladite composition.

13. Procédé pour la préparation d'une composition de mélange lequel procédé comprend le mélange de

(i) un ou plusieurs carburants de base ayant une teneur en composés aromatiques au-dessous de 80 % en poids, ledit ou lesdits carburants de base étant présents à hauteur de 10 à 95 % en poids de la composition de mélange ;
(ii) un mélange d'additifs pour carburant comprenant un ou plusieurs additifs pour carburant, lesdits additifs comprenant un agent antimousse contenant de la silicone ;
(iii) un alcool alkylique qui est choisi parmi les alcools alkyliques en C_{17-20}, à hauteur de 0,01 à 30 % en poids de la composition de mélange ; et éventuellement
(iv) un solvant aromatique ayant une teneur en composés aromatiques supérieure à 80 % en poids.

14. Composition de carburant comprenant un second carburant de base et une composition de mélange selon l'une quelconque des revendications 1 à 12, dans laquelle ledit second carburant de base peut être le même que le carburant de base dans ladite composition de mélange ou différent de celui-ci.

15. Composition de mélange, procédé ou composition de carburant selon l'une quelconque des revendications précédentes, dans lesquels ledit agent antimousse comprend un polysiloxane modifié par polyéther.

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