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(54) **GASOLINE COMPOSITION**

BENZINZUSAMMENSETZUNG

COMPOSITION D'ESSENCE

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Description

[0001] This invention relates to low sulphur gasoline compositions which have improved response to friction reducing additives.

[0002] Fuels such as gasolines and diesels are used rather widely in automotive transport and for providing power for heavy duty equipment, especially diesels due to their high fuel economy. However, one of the problems when such fuels are burned in internal combustion engines is their low lubricity. This reduction in lubricity arises because as the sulphur content in the fuel is reduced eg by hydrodesulphurisation, this process also incidentally removes the lubricity providing polar or friction reducing molecules such as eg the nitrogenous compounds present in such fuels. A prior published SAE Paper No. 962010 by Wei Dan Ping et al entitled "Comparison of the Lubricity of Gasoline and Diesel Fuels" (1996) describes the effects of various additives on such fuels including low sulphur fuels. Whilst efforts hitherto have been devoted to the addition of such friction reducing nitrogenous compounds into the fuels after hydrodesulphurisation to restore the lubricity of the fuel, little attention has been paid to the nature of the fuel itself in order to improve the efficiency of such fuels.

[0003] Prior published GB-A-2306246 and GB-A-2307247 relate to the use of carboxylic acid derivatives as an additive for improving the lubricity of low sulphur-content fuels which are primarily middle distillate fuels such as eg diesel, jet and biodiesel fuels. However, there is no mention of gasolines or fuels having a sulphur content of less than 30 ppm in these documents.

[0004] Similarly, EP-A-0860494, EP-A-0739970 and EP-A-0635558 relate to low sulphur diesel, gas oils and gas oils (diesel fuels) respectively containing esters derived by transesterification of vegetable oils, glycerol/fatty acid esters and lower alkyl esters of a mixture of saturated and unsaturated fatty acids derived from oleaginous seeds respectively as a lubricity improving agent. In each case there is no mention of low sulphur gasolines, especially gasolines having a sulphur content of < 30 ppm.

[0005] EP-A-0 829 527 discloses additives for gasolines containing ashless friction modifiers among other constituents.

[0006] WO99/00467 describes a fuel composition of improved lubricity comprising a spark ignition fuel and an alkanolamide of a fatty acid or a modified fatty acid having a maximum sulphur content of 0.05% based on mass. However, no gasolines are mentioned and all of the examples relate to diesels, especially Swedish Class I low sulphur diesel fuel. There is also no reference to the bromine number or UV absorbance of the fuels tested or claimed.

[0007] It has now been found that the efficacy of the friction reducing additives can be significantly improved by mixing the same with fuels of specific, predetermined characteristics.

[0008] Accordingly, the present invention as disclosed in the wording of independent claim 1 is a composition comprising (i) a low sulphur gasoline having a sulphur content of less than 30 ppm, a bromine number of less than 10 and an ultraviolet absorbance at 319 nm below 0.15 and (ii) less than 1000 mg per kg of the low sulphur gasoline of an ashless friction reducing additive which is a fatty acid having 10-30 carbon atoms derived from naturally occurring fats and oils or a derivative thereof selected from the alkylamine salts, alkylamides and alkylesters of such acids and oligomers thereof.

[0009] The gasoline has a bromine number (which is related to the amount of olefins in the fuel) below 10, suitably below 5 and preferably below 4.5. Furthermore, the gasoline has a sulphur content below 30 ppm, suitably below 20 ppm and preferably below 10 ppm. Again the UV absorbance of the fuel at 319 nm can preferably be below 0.1, suitably below 0.07 and more preferably below 0.05.

[0010] The ashless friction reducing additive in the composition is suitably a liquid at room temperature and pressure and is selected from C10-C30 fatty acids, preferably a C10-C24 fatty acid derived from naturally occurring fats and oils and the derivatives selected from the alkylamine salts, alkyl amides and alkyl esters of such acids and oligomers thereof. An example of an alkyl amine carboxylate salt is n-butylamine oleate and an example of another naturally occurring fatty acid is a substance comprising a fatty acid, a tall oil fatty acid.

n-Butylamine oleate has the formula:



One such n-butylamine oleate is commercially sold as a friction modifier as RS124 by Bitrez Ltd.

[0011] The substance comprising fatty acids may be either 100% fatty acids, or substantially 100% fatty acids, or may be a mixture of fatty acids and/or tall oil acids or derivatives thereof. Such a mixture suitably contains at least 30% w/w, preferably at least 50% w/w of fatty acids. An example of a suitable commercially available substance containing fatty acids is TOLAD® 9103 (ex Baker-Petrolite Ltd).

[0012] The friction reducing additive is used in an amount sufficient to provide effective lubricity to the composition. The friction reducing additive is used in an amount of less than 1000 mg per kilogram of base fuel in the composition, preferably from 1 to 500 mg and more preferably from about 5 to 100 mg per kg of base fuel in the composition. It has been found that a gasoline with these characteristics is much more responsive to the amount of the ashless friction reducing agent specified above added than conventional fuels which do not possess these characteristics. A typical

example of such a gasoline is the so called "Rotterdam gasoline" which suitably has a final boiling point below 200°C, preferably about 185°C. The ashless friction reducing additive may be part of an additive concentrate comprising a number of additives. In the additive concentrate, the amount of the friction reducing additive is suitably from 0.2-25% w/w, preferably from 0.5-20% w/w and more preferably from 3 to 15% w/w. On the basis of the total concentrate, the treat level of the friction reducing additive in the gasoline is suitably from 4-200 ppm, preferably from 10-100 ppm and more preferably from 25-75 ppm.

[0013] The present invention is further illustrated with reference to the following Examples and comparative tests:

EXAMPLES:

[0014] The following fuels with varying degrees of bromine numbers, sulphur content and UV absorbance at 319 nm were tested for their responsiveness to a lubricity additive. Of these, both the Rotterdam and the Neste 95UL base gasolines show comparable sulphur contents, yet the Rotterdam fuel (which has a final boiling point of 186.2°C) is more responsive to lubricity additive. This responsiveness, as measured by the percentage reduction in friction relative to base fuel (Table 2) is linked to the fuel's substantially lower bromine number and UV absorption at 319 nm. (Table 1) (Note: the measure of UV absorbance and bromine number are both dimensionless quantities).

TABLE 1

FUEL & SOURCE	BROMINE NO.	% SULPHUR BY WT	UVA (319 nm)
Fawley (A)*	37.72	0.04	0.398
Neste 95UL*	21.7	0.0027	0.323
Rotterdam	4.17	0.0028	0.038
Fawley (B)*	16.11	0.01	0.172
Fawley (C)*	13.28	0.02	0.567
*Indicates a test fuel not according to the invention.			

[0015] The above fuels were tested at various treat rates to determine the change in coefficient of friction and the mean friction values and the results are tabulated in Tables 2 and 3 below:

TABLE 2

Base Fuel	Additive	Treat Rate ml/1000 litres	Mean FC	ΔFC	%ΔFC
Fawley (A)	None	0	0.224		
Fawley (B)	n-BAO	12.5	0.154	0.071	31.5
Fawley (C)	Tolad® 9103	12.5	0.145	0.079	35.3
Neste 95 UL	None	0	0.225		
Neste 95 UL	n-BAO	12.5	0.152	0.073	32.5
Neste 95 UL	Tolad® 9103	12.5	0.153	0.072	32.1
Rotterdam#	None	0	0.439		
Rotterdam#	n-BAO	12.5	0.157	0.283	64.4
Rotterdam#	Tolad® 9103	12.5	0.152	0.287	65.5
Fawley (B)	None	0	0.304		
Fawley (B)	n-BAO	12.5	0.158	0.146	47.9
Fawley (B)	Tolad® 9103	12.5	0.214	0.090	29.7

Table continued

Base Fuel	Additive	Treat Rate ml/1000 litres	Mean FC	Δ FC	% Δ FC
Fawley (C)	None	0*	0.315		
Fawley (C)	n-BAO	12.5*	0.204	0.111	35.2
Fawley (C)	Tolad® 9103	12.5*	0.218	0.097	30.8
Mean FC= mean friction coefficient Δ FC= Mean FC (base fuel)- Mean FC (additised fuel) % Δ FC= [Mean FC (base fuel)- Mean FC (additised fuel)] x 100/ Mean FC (base fuel) *These are by weight ie mg/Kg #Fuels according to the invention.					

TABLE 3

Base Fuel	Additive	Treat Rate mg/Kg	Mean Friction Coefficient	% Δ Friction Coefficient
Fawley (C)	None	0	0.315	
Fawley (C)	n-BAO	12.5	0.204	35.2
Fawley (C)	n-BAO	25	0.146	53.6
Fawley (C)	n-BAO	50	0.132	58.1
Fawley (C)	n-BAO	100	0.118	62.5
Fawley (C)	None	0	0.315	
Fawley (C)	Tolad® 9103	12.5	0.218	30.8
Fawley (C)	Tolad® 9103	25	0.174	44.8
Fawley (C)	Tolad® 9103	50	0.149	52.7
Fawley (C)	Tolad® 9103	100	0.137	56.5
n-BAO - n-butylamine oleate; Tolad® FC-Friction Coefficient				

Claims

1. A composition comprising (i) a low sulphur gasoline having a sulphur content of less than 30 ppm, a bromine number of less than 10 and an ultraviolet absorbance at 319 nm below 0.15 and (ii) less than 1000 mg per kg of the low sulphur gasoline of an ashless friction reducing additive which is a fatty acid having 10-30 carbon atoms derived from naturally occurring fats and oils or a derivative thereof selected from the alkylamine salts, alkylamides and alkylesters of such acids and oligomers thereof.
2. A composition according to Claim 1 wherein the gasoline has a bromine number below 5 ppm.
3. A composition according to any one of the preceding Claims wherein the gasoline has a sulphur content below 20 ppm.
4. A composition according to any one of the preceding Claims wherein the gasoline has an UV absorbance at 319 nm of below 0.07.
5. A composition according to any one of the preceding Claims wherein the fatty acid is derived from naturally occurring fats and oils and oligomers thereof.

6. A composition according to any one of the preceding Claims wherein the ashless friction reducing additive is an alkylamine salt of a fatty acid derived from naturally occurring fats and oils and oligomers thereof.
7. A composition according to any one of Claims 1-4 wherein the ashless friction reducing additive is an alkylamide of a fatty acid derived from naturally occurring fats and oils and oligomers thereof.
8. A composition according to any one of the preceding Claims 1-4 wherein the ashless friction reducing additive is an alkylester of a fatty acid derived from naturally occurring fats and oils and oligomers thereof.
9. A composition according to Claim 6 wherein the alkylamine carboxylate salt is n-butylamine oleate as shown in the formula below or a derivative thereof



10. A composition according to any one of claims 1-4 wherein the long chain fatty acid or a derivative thereof is a substance comprising tall oil acid or derivatives thereof.
11. A composition according to any one of the preceding Claims wherein the treat level of the friction reducing additive is from 1-500 mg per kg of gasoline.
12. A composition according to any one of the preceding Claims wherein the treat level of the friction reducing additive is from 4-200 ppm based on the gasoline.
13. A composition according to any one of the preceding Claims wherein the treat level of the friction reducing additive is from 10-100 ppm based on the gasoline.
14. A composition according to any one of the preceding Claims wherein the treat level of the friction reducing additive is from 25-75 ppm based on the gasoline.
15. A method for improving the efficacy of ashless friction reducing additive used in low sulphur gasoline, wherein a friction reducing additive which is a fatty acid having 10-30 carbon atoms derived from naturally occurring fats and oils or a derivative thereof selected from the alkylamine salts, alkylamides and alkylesters of such acids and oligomers thereof is combined, at a treat level of less than 1000 mg per kg of gasoline, with a gasoline having a sulphur content of less than 30 ppm, a bromine number of less than 10 and an ultraviolet absorbance at 319 nm below 0.15.

Patentansprüche

1. Zusammensetzung, die (i) schwefelarmes Benzin mit einem Schwefelgehalt von weniger als 30 ppm, einer Bromzahl von weniger als 10 und einer Ultraviolett-Extinktion bei 319 nm unter 0,15 und (ii) weniger als 1000 mg aschefreies Reibungsverminderungsadditiv pro kg des schwefelarmen Benzins umfasst, welches eine Fettsäure mit 10 bis 30 Kohlenstoffatomen, die von natürlich vorkommenden Fetten oder Ölen abgeleitet ist, oder ein Derivat davon ausgewählt aus den Alkylaminsalzen, Alkylamiden und Alkylestern derartiger Säuren und Oligomeren davon ist.
2. Zusammensetzung nach Anspruch 1, bei der das Benzin eine Bromzahl unter 5 ppm hat.
3. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der das Benzin einen Schwefelgehalt unter 20 ppm hat.
4. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der das Benzin eine UV-Extinktion bei 319 nm von unter 0,07 hat.
5. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der die Fettsäure von natürlich vorkommenden Fetten und Ölen und Oligomeren davon abgeleitet ist.
6. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der das aschefreie Reibungsverminderungsadditiv Alkylaminsalz von Fettsäure, die von natürlich vorkommenden Fetten und Ölen abgeleitet ist, und Oligomeren davon ist.

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7. Zusammensetzung nach einem der Ansprüche 1 bis 4, bei der das aschefreie Reibungsverminderungsadditiv Alkylamid von Fettsäure, die von natürlich vorkommenden Fetten und Ölen abgeleitet ist, und Oligomeren davon ist.

8. Zusammensetzung nach einem der vorhergehenden Ansprüche 1 bis 4, bei der das aschefreie Reibungsverminderungsadditiv Alkylester von Fettsäure, die von natürlich vorkommenden Fetten und Ölen abgeleitet ist, und Oligomeren davon ist.

9. Zusammensetzung nach Anspruch 6, bei der das Alkylaminocarboxylatsalz n-Butylaminoleat wie in der folgenden Formel gezeigt oder ein Derivat davon ist:



10. Zusammensetzung nach einem der Ansprüche 1 bis 4, bei der die langkettige Fettsäure oder ein Derivat davon eine Substanz ist, die Tallölsäure oder Derivate davon umfasst.

11. Zusammensetzung nach einem der vorhergehenden Ansprüche, wobei die Behandlungskonzentration des Reibungsverminderungsadditivs 1 bis 500 mg pro kg Benzin beträgt.

12. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der die Behandlungskonzentration des Reibungsverminderungsadditivs 4 bis 200 ppm ist, bezogen auf Benzin.

13. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der die Behandlungskonzentration des Reibungsverminderungsadditivs 10 bis 100 ppm ist, bezogen auf Benzin.

14. Zusammensetzung nach einem der vorhergehenden Ansprüche, bei der die Behandlungskonzentration des Reibungsverminderungsadditivs 25 bis 75 ppm ist, bezogen auf Benzin.

15. Verfahren zur Verbesserung der Effizienz von in schwefelarmem Benzin verwendetem aschefreiem Reibungsverminderungsadditiv, bei dem Reibungsverminderungsadditiv, das Fettsäure mit 10 bis 30 Kohlenstoffatomen, die von natürlich vorkommenden Fetten und Ölen abgeleitet ist, oder ein Derivat davon ausgewählt aus den Alkylaminsalzen, Alkylamiden und Alkylestern dieser Säuren und Oligomeren davon ist, in einer Behandlungskonzentration von weniger als 1000 mg pro kg Benzin mit Benzin mit einem Schwefelgehalt von weniger als 30 ppm, einer Bromzahl von weniger als 10 und einer Ultraviolett-Extinktion bei 319 nm unter 0,15 kombiniert wird.

Revendications

1. Composition comprenant (i) une essence à faible teneur en soufre ayant une teneur en soufre inférieure à 30 ppm, un indice de brome inférieur à 10 et une absorption d'ultraviolets à 319 nm en dessous de 0,15 et (ii) moins de 1 000 mg par kg d'essence à faible teneur en soufre d'un additif de réduction de friction sans cendre qui est un acide gras ayant de 10 à 30 atomes de carbone dérivé de graisses et d'huiles apparaissant à l'état naturel ou un dérivé de celui-ci choisi parmi les sels d'alkylamine, les alkylamides et les alkylesters de ces acides et leurs oligomères.

2. Composition selon la revendication 1, dans laquelle l'essence a un indice de brome en dessous de 5 ppm.

3. Composition selon l'une quelconque des revendications précédentes, dans laquelle l'essence a une teneur en soufre en dessous de 20 ppm.

4. Composition selon l'une quelconque des revendications précédentes, dans laquelle l'essence a une absorption d'UV à 319 nm en dessous de 0,07.

5. Composition selon l'une quelconque des revendications précédentes, dans laquelle l'acide gras dérive de graisses et d'huiles apparaissant à l'état naturel et leurs oligomères.

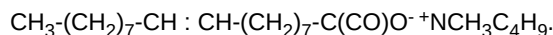
6. Composition selon l'une quelconque des revendications précédentes, dans laquelle l'additif de réduction de friction sans cendre est un sel d'alkylamine d'un acide gras dérivé de graisses et d'huiles apparaissant à l'état naturel et leurs oligomères.

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7. Composition selon l'une quelconque des revendications 1 à 4, dans laquelle l'additif de réduction de friction sans cendre est un alkylamide d'un acide gras dérivé de graisses et d'huiles apparaissant à l'état naturel et leurs oligomères.

8. Composition selon l'une quelconque des revendications 1 à 4, dans laquelle l'additif de réduction de friction sans cendre est un alkylester d'un acide gras dérivé de graisses et d'huiles apparaissant à l'état naturel et leurs oligomères.

9. Composition selon la revendication 6, dans laquelle le sel carboxylate d'alkylamine est le n-butylamine oléate représenté par la formule ci-après ou un dérivé de celui-ci :



10. Composition selon l'une quelconque des revendications 1 à 4, dans laquelle l'acide gras à longue chaîne ou un dérivé de celui-ci est une substance comprenant l'acide résinique ou ses dérivés.

11. Composition selon l'une quelconque des revendications précédentes, dans laquelle le niveau de traitement de l'additif de réduction de friction est de 1-500 mg par kg d'essence.

12. Composition selon l'une quelconque des revendications précédentes, dans laquelle le niveau de traitement de l'additif de réduction de friction est de 4-200 ppm calculé sur l'essence.

13. Composition selon l'une quelconque des revendications précédentes, dans laquelle le niveau de traitement de l'additif de réduction de friction est de 10-100 ppm calculé sur l'essence.

14. Composition selon l'une quelconque des revendications précédentes, dans laquelle le niveau de traitement de l'additif de réduction de friction est de 25-75 ppm calculé sur l'essence.

15. Procédé pour améliorer l'efficacité d'un additif de réduction de friction sans cendre utilisé dans une essence à faible teneur en soufre, dans lequel on combine un additif de réduction de friction qui est un acide gras ayant 10-30 atomes de carbone dérivé de graisses et d'huiles apparaissant à l'état naturel ou un dérivé de celui-ci choisi parmi les sels d'alkylamine, les alkylamides et les alkylesters de ces acides et leurs oligomères, à un niveau de traitement inférieur à 1 000 mg par kg d'essence, avec une essence ayant une teneur en soufre inférieure à 30 ppm, un indice de brome inférieur à 10 et une absorption d'ultraviolets à 319 nm en dessous de 0,15.