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(54) **Use of a Gas-to-Liquids gas oil in a lamp oil composition or fire lighter**

(57) The present invention relates to the use of a Gas-to-Liquids gas oil (GTL gas oil) in a combustible composition, wherein said combustible composition is a lamp oil composition or a fire lighter composition. In particular, the present invention relates to the use of a GTL gas oil as a lamp oil and to the use of a GTL gas oil as

a fire lighter.

The invention further relates to a combustible composition comprising a Gas-to-Liquids gas oil (GTL gas oil) and a thickening agent, and to a fire lighter composition comprising a combustible composition according to the invention.

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Description

Field of the invention

[0001] The present invention relates to the use of a Gas-to-Liquids gas oil (GTL gas oil) in a combustible composition, wherein said combustible composition is a lamp oil composition or a fire lighter composition. The present invention particularly relates to the use of a GTL gas oil as a lamp oil and to the use of a GTL gas oil as a fire lighter.

[0002] The invention further relates to a combustible composition comprising a GTL gas oil and a thickening agent, and to a fire lighter composition comprising a combustible composition according to the invention.

Background of the invention

[0003] In general, conventional lamp oils are petroleum based, and obtained from the processing of crude oil. Conventional lamp oil comprises a mixture of petroleum based n- and iso-paraffines, generally a mixture of C₁₀ - C₁₃ n- and iso-paraffins. Due to its petroleum origin, conventional lamp oils comprise several impurities, for example various sulfur compounds. These sulfur containing impurities give rise to an unpleasant odor during the combustion of conventional petroleum-based lamp oils.

[0004] WO 2010/091690, incorporated by reference, discloses the use of alkyl esters of a C₆ - C₁₆ carboxylic acid or mixtures thereof as a fuel composition. The fuel composition may be used as a lamp fuel, a lighter fuel, and/or a fuel for cooking, heating or cooling. A composition of a lamp fuel is provided, the composition comprising by weight 35-45% C₈ methyl esters, 25- 35% C₁₀ methyl esters, 15-25% C₁₂ methyl esters, and/or 5-15% C₁₄ methyl esters.

[0005] EP 1132456, incorporated by reference, discloses the use of fat derivatives selected from fatty acid glycerides, fatty acid esters, fatty alcohols and guerbet alcohols with a solidification temperature of below 0°C, an iodine number of less than 20 and a surface tension of greater than 25 mN/m, as lamp oils and lighting fluids for charcoal grills. Preferred materials are esters of C₈ - C₁₈ fatty acids with linear and/or branched C₁ - C₈ alcohols. The fat derivative may be mixed with thickeners (polysaccharides, cellulose derivatives, polyethylene glycol mono- and -diesters, polyacrylates, etc.) and natural or artificial perfumes and dyes before use.

[0006] DE 10137865, incorporated by reference, discloses a water-miscible liquid fuel comprising a nontoxic oxygen-containing hydrocarbon derivative that has a surface tension of at least 25 mN/m (20°C) and a flash point of at least 55°C and is miscible with water in a volume ratio of at least 90:10.

[0007] WO 2005/007784 discloses a method of thickening liquid hydrocarbons comprising mixing the hydrocarbon with an essentially paraffin polyolefin polymer in

solid form to yield a thickened homogenous solution. The hydrocarbon is preferably kerosene and the polymer may be a "Vistanex" polymer. The product may be used as a lamp oil but may also be applied to charcoal for use as a lighting fuel for barbecues.

Summary of the invention

[0008] The present invention relates to the use of a Gas-to-Liquids gas oil (GTL gas oil) in a combustible composition, wherein the combustible composition is a lamp oil composition or a fire lighter composition. The present invention particularly relates to the use of a GTL gas oil as a lamp oil and to the use of a GTL gas oil as a fire lighter.

[0009] The invention also relates to a combustible composition comprising a GTL gas oil and a thickening agent.

[0010] The invention further relates to a fire lighter composition comprising a combustible composition according to the invention.

[0011] The use of a GTL gas oil in a lamp oil composition or in a fire starter composition and the combustible composition according to the invention have several advantages. A GTL gas oil comprises no, or hardly any, sulfur impurities, and as a consequence, the GTL gas oil does not give rise to an unpleasant odor when combusted. Due to the high cetane number of a GTL gas oil, combustion occurs cleaner than combustion of conventional lamp oils known in the art. In addition, the compositions according to the present invention are not based on the petroleum feedstock.

Detailed description of the invention

Definitions

[0012] The verb "to comprise" as is used in this description and in the claims and its conjugations is used in its non-limiting sense to mean that items following the word are included, but items not specifically mentioned are not excluded.

[0013] In addition, reference to an element by the indefinite article "a" or "an" does not exclude the possibility that more than one of the element is present, unless the context clearly requires that there is one and only one of the elements. The indefinite article "a" or "an" thus usually means "at least one".

[0014] In a first aspect the present invention relates to the use of a Gas-to-Liquids gas oil (GTL gas oil) in a combustible composition, wherein the combustible composition is a lamp oil composition or a fire lighter composition. The term "Gas-to-Liquids gas oil" is described in more detail below. The term "fire lighter", also referred to as "fire starter" in the art, herein refers to a combustible substance that can be used to start a fire. A fire lighter can for example be used to light a charcoal fire, e.g. in a barbecue, to light a wood fire, e.g. in a fire place or a wood

burning stove, etc.

[0015] In a preferred embodiment, said combustible composition comprises about 80 wt.% or more, preferably about 90 wt.% or more, more preferably about 95 wt.% or more, even more preferably about 97 wt.% or more and even more preferably about 98 wt.% or more of the GTL gas oil, based on the total weight of the composition. Most preferably the combustible composition comprises about 99 wt.% or more of the GTL gas oil, based on the total weight of the combustible composition. The invention therefore also relates to the use of a GTL gas oil as a lamp oil, and to the use of a GTL gas oil as a fire lighter.

[0016] In another preferred embodiment said combustible composition comprises about 40 wt.% or more, preferably about 60 wt.% or more, more preferably about 70 wt.% or more and most preferably about 75 wt.% or more of the GTL gas oil, based on the total weight of the composition.

[0017] The combustible composition may comprise additional components, for example additional hydrocarbons and/or thickening agents. Suitable thickening agents and hydrocarbons are known in the art. Examples of suitable thickening agents and hydrocarbons are described below. The combustible composition may further comprise additives, for example antistatic agents. Suitable antistatic agents are known in the art.

[0018] When said combustible composition is a fire lighter composition, said composition may further comprise a suitable combustible carrier material. Suitable combustible carrier materials are known in the art, and include for example softboard, fibreboard, saw dust, wood chips, urea formaldehyde resin, cellulose derived material, etc.

Gas-to-Liquids gas oil

[0019] A Gas-to-Liquids gas oil (GTL gas oil) herein refers to a Fischer-Tropsch derived gas oil, wherein "Fischer-Tropsch derived" means that said gas oil is, or derives from, a synthesis product of a Fischer-Tropsch condensation process. A GTL gas oil may thus also be referred to as a Fischer-Tropsch derived gas oil.

[0020] GTL gas oils are known in the art, and are also referred to as GTL Gasoil, GTL Fuel, GTL Diesel, Fischer-Tropsch (FT) gas oil, FT Diesel, FT middle distillates or SMDS gas oil (wherein SMDS stands for "Shell Middle Distillate Synthesis). GTL gas oils are generally referred to as "Distillates (Fischer-Tropsch) C8-26, Branched and Linear" with CAS number 848301-67-7.

[0021] Fischer-Tropsch derived gas oils are known in the art and in use in for instance automotive diesel fuel compositions. They tend to be low in undesirable fuel components such as sulphur, nitrogen and aromatics and also have lower densities than their petroleum derived counterparts.

[0022] An example of a Fischer-Tropsch based process for the production of, amongst others, GTL gas oils

is the SMDS (Shell Middle Distillate Synthesis) described by van der Burgt et. al. in "The Shell Middle Distillate Synthesis Process", Shell International Petroleum Company Ltd., London, UK, November 1989, incorporated by reference herein. This process, also referred to as the Shell "Gas-To-Liquids" or "GTL" technology, produces middle distillate range products by conversion of a natural gas (primarily methane) derived synthesis gas into a heavy long chain hydrocarbon (paraffin) wax which can then be hydroconverted and fractionated to produce liquid transport fuels such as the gas oils useable in automotive diesel fuel compositions. Gas oils, naphthas and kerosenes prepared by the SMDS process are commercially available for instance from Shell companies. Alternatively, GTL gas oils may for example be prepared by the Sasol SPD (Slurry Phase Distillate) process.

[0023] Further examples of Fischer-Tropsch derived gas oils are described in for example EP 0583836, EP 1101813, WO 97/14768, WO 97/14769, WO 00/20534, WO 00/20535, WO 00/11116, WO 00/11117, WO 01/83406, WO 01/83641, WO 01/83647, WO 01/83648, WO 2008/000778 and US 6204426, all incorporated by reference herein.

[0024] The GTL gas oil applied in the present invention preferably has an initial boiling point of about 120°C and a boiling range of about 120 to about 400°C. More preferably, the GTL gas oil has an initial boiling point of about 150°C and a boiling range of about 150 to about 380°C. Even more preferably, the GTL gas oil has an initial boiling point of about 170°C and a boiling range of about 150 to about 370°C. The majority of the components of the GTL gas oil, i.e. about 90% w/w or greater, preferably about 95% w/w or greater, should have a boiling point in the range of about 120 to about 400°C, preferably in the range of about 150 to 380°C and more preferably in the range of about 170 to about 370°C.

[0025] By virtue of the Fischer-Tropsch process, a Fischer-Tropsch derived gas oil comprises essentially no sulphur and nitrogen. Further, the Fischer-Tropsch process as usually operated produces virtually no aromatic components.

[0026] Preferably, the aromatic hydrocarbons content of said GTL gas oil, as determined by EN 12916, is 1% w/w or lower, preferably 0.5% w/w or lower and more preferably 0.1 % w/w or lower. The polycyclic aromatic hydrocarbons content of said GTL gas oil, as determined by EN 12916, is preferably 1% w/w or lower, preferably 0.5% w/w or lower and more preferably 0.1% w/w or lower.

[0027] The total olefin content of the GTL gas oil, as determined by ASTM D1159, is preferably 0.5% w/w or lower, more preferably 0.1% w/w or lower.

[0028] The sulphur content, as determined by ISO 14596, is preferably 5 mg/kg or less, more preferably 4 mg/kg or less and most preferably 3 mg/kg or less.

[0029] The density of the GTL gas oil is preferably in the range of about 760 to about 800, preferably about 760 to about 780, kg/m³ at 15°C, as determined by ISO

3675.

[0030] The kinematic viscosity of the GTL gas oil is preferably in the range of about 2.0 to about 4.5 mm²/s at 40°C, more preferably in the range of about 2.5 to about 4.0 and most preferably in the range of about 2.9 to about 3.8 mm²/s at 40°C, as determined by ISO 3405.

[0031] The cetane number of a fuel composition is a measure of its ease of ignition and combustion. In general, the higher the cetane number of a fuel the more easily the fuel will ignite and combust. The GTL gas oil preferably has a cetane number, as determined by ISO 5165, of 65 or higher, more preferably of 70 or higher. The cetane number typically is in the range of 74 to 85.

[0032] The GTL gas oil preferably has a flash point of about 50°C or higher, more preferably of about 55°C or higher, as determined by EN 22719.

[0033] As was described above, the GTL gasoil is, or is derived from, a synthesis product of a Fischer-Tropsch condensation process. When the GTL gas oil is derived from a synthesis product of a Fischer-Tropsch process, it is preferably a hydrocracked Fischer-Tropsch synthesis product (such as for example described in GB 2077289 and/or EP 0147873, both incorporated by reference herein), or more preferably a product from a two-stage hydroconversion process such as for example described in EP 0583836, incorporated by reference herein.

[0034] Said Fischer-Tropsch derived fuel component consists of at least 70% w/w, preferably at least 80% w/w, more preferably at least 90% w/w, and most preferably at least 95, 98 or even 99% w/w of paraffinic components, preferably iso- and normal-paraffins. The weight ratio of iso-paraffins to normal paraffins may for example be 0.3 or greater, and may for example be up to 12. In one embodiment, said weight ratio is from 2 to 6. As is known in the art, the actual value for this ratio is partly determined by the hydroconversion process used to prepare the GTL gas oil from the Fischer-Tropsch synthesis product.

[0035] Suitable GTL Gas oils are for example commercially available from Shell companies under the name GTL Gasoil or GTL Fuel, or from Sasol under the name GTL Diesel. In a preferred embodiment, the GTL gas oil is GTL Gasoil or GTL Fuel, commercially available from Shell.

[0036] The combustible composition according to the invention may comprise another GTL fuel, for example a GLT naphtha, a GTL kerosene or a GTL normal paraffin fuel. These GTL products are known in the art, and are described in more detail in for example EP 0583836, EP 1101813, WO 97/14768, WO 97/14769, WO 00/20534, WO 00/20535, WO 00/11116, WO 00/11117, WO 01/83406, WO 01/83641, WO 01/83647, WO 01/83648, WO 2008/000778 and US 6204426, all incorporated by reference herein.

[0037] As was described above, the present invention relates to the use of a GTL gas oil in a combustible composition, wherein the combustible composition is a lamp oil composition or a fire lighter composition. Said GTL gas oil and preferred embodiments thereof are described

in more detail above.

[0038] In a preferred embodiment of the invention, the invention relates to the use of a GTL gas oil in a combustible composition, wherein the combustible composition is a lamp oil composition or a fire lighter composition, and wherein the GTL gas oil has a cetane number of 65 or higher, preferably 70 or higher, as determined by ISO 5165.

[0039] More preferably, the GTL gas oil in said combustible composition has an initial boiling point of about 120°C and a boiling range of about 120 to about 400°C, preferably an initial boiling point of about 150°C and a boiling range of about 150 to about 380°C, and more preferably an initial boiling point of about 170°C and a boiling range of about 170 to about 370°C.

[0040] In another preferred embodiment, said combustible composition comprises 80 wt.% or more of the GTL gas oil, preferably 90 wt.% or more, more preferably 98 wt.% or more. In another preferred embodiment, said combustible composition comprises 98 wt.% or more of the GTL gas oil. In another preferred embodiment, said combustible composition consists essentially of a GTL gas oil. With the term "consists essentially of" it is meant that said combustible composition comprises 99 wt.% or more of said GTL gas oil.

Combustible composition

[0041] The present invention also relates to a combustible composition comprising a Gas-to-Liquids gas oil (GTL gas oil) and a thickening agent.

[0042] The combustible composition according to the invention may for example be used as a fire lighter or as a burning paste for e.g. a gel candle or a chafing dish.

[0043] In one embodiment, said composition comprises about 70 wt.% or more, preferably about 80 wt.% or more, more preferably about 90 wt.% or more, and most preferably about 95 wt.% or more of the GTL gas oil.

[0044] Preferably, the combustible composition according to the invention comprises about 0.5 to about 30 wt.% of the thickening agent, relative to the total weight of the composition. In a further preferred embodiment, said combustible composition comprises about 0.7 to about 20 wt.%, more preferably about 1 to about 10 wt.% of the thickening agent, and most preferably about 1 to about 5 wt.% of the thickening agent, all relative to the total weight of the composition.

[0045] Suitable thickening agents are known in the art, and are for example disclosed in US 5744694, US 5879694, US 5132355 and WO 2005/007784, all incorporated by reference herein. US 5744694 discloses the use of a crosslinked copolymer of an acrylic acid and a vinyl ester of trialkylacetic acids with a highly branched structure as a thickening agent. US 5879694 discloses the use of certain block copolymers, in particular triblock copolymers, as thickening agents. Preferred block copolymers include Kraton® polymers, preferably the Kraton D or Kraton G series, commercially available from

Kraton Performance Polymers, Inc. US 5132355 discloses the use of polyethylene block copolymers as thickening agent. WO 2005/007784 discloses the use of polyolefins, preferably a branched chain polyolefin such as for example a polyisobutene polymer, as a thickening agent. Preferred polyolefins include Vistanex® polymers, e.g. Vistanex® MML-120. Other suitable thickening agents include polyamides, for example Sylvagel® types, e.g. Sylvagel 5100, commercially available from Arizona Chemical Company.

[0046] In a preferred embodiment, the thickening agent is selected from the group consisting of polyolefins and polyamides. In a further preferred embodiment, the thickening agent is selected from the group consisting of Kraton® polymers, Vistanex® polymers and Sylvagel® polymers, more preferably from the group of Sylvagel® polymers. Most preferably, the thickening agent is Sylvagel® 5100.

[0047] The combustible composition according to the invention optionally comprises one or more additives, for example antistatic agents etc. Suitable antistatic agents are known in the art. Said additives may not be present in an amount that negatively influences the combustion properties of the composition. Consequently, said additives preferably do not cause formation of harmful products and do not cause obstruction (slag formation) of the wick.

[0048] Said combustible composition may comprise about 70 to about 99.5 wt.% of a GTL gas oil and about 0.5 to about 30 wt.% of a thickening agent, based on the total weight of the composition. In this embodiment, it is preferred that the total amount of thickening agent that is present in said composition does not exceed 30 wt.%. Preferably, said combustible composition comprises about 80 to about 99.3 wt.% of a GTL gas oil and about 0.7 to about 20 wt.% of a thickening agent, based on the total weight of the composition. In this embodiment, it is preferred that the total amount of thickening agent that is present in said composition does not exceed 20 wt.%. In a more preferred embodiment, said combustible composition comprises about 90 to about 99 wt.% of a GTL gas oil and about 1 to about 10 wt.% of a thickening agent, based on the total weight of the composition. In this embodiment, it is preferred that the total amount of thickening agent that is present in said composition does not exceed 10 wt.%. In a further preferred embodiment, said combustible composition comprises about 95 to about 98 wt.% of a GTL gas oil and about 2 to about 5 wt.% of a thickening agent, all based on the total weight of the composition. In this embodiment, it is preferred that the total amount of thickening agent that is present in said composition does not exceed 5 wt.%.

[0049] The combustible composition according to the invention may comprise one or more additional components, for example one or more additional combustible hydrocarbons and/or one or more combustible carrier materials. Suitable combustible hydrocarbons are known in the art. Examples of additional hydrocarbons include

other GTL fuels such as GTL naphtha, GTL kerosene, GTL normal paraffines, GTL waxes, and combinations thereof. Suitable combustible carrier materials are known in the art, and include for example softboard, fibreboard, saw dust, wood chips, urea formaldehyde resin, cellulose derived material, etc.

[0050] When the combustible composition according to the invention comprises one or more additional combustible hydrocarbons and/or one or more combustible carrier materials as described above, it is preferred that said combustible composition comprises about 20 wt.% or more, preferably about 30 wt.% or more, more preferably about 40 wt.% or more, even more preferably about 50 wt.% or more, and most preferably about 60 wt.% or more of the GTL gas oil, all based on the total weight of the composition.

[0051] In a preferred embodiment, the combustible composition according to the invention comprises a GTL gas oil having a cetane number of 65 or higher, preferably of 70 or higher, as determined by ISO 5165.

[0052] In a preferred embodiment, the combustible composition according to the invention comprises a GTL gas oil having an initial boiling point of about 120°C and a boiling range of about 120 to about 400°C, preferably an initial boiling point of about 150°C and a boiling range of about 150 to about 380°C, and more preferably an initial boiling point of about 170°C and a boiling range of about 170 to about 370°C.

[0053] The invention further relates to a fire lighter composition comprising a combustible composition according to the invention. Said combustible composition and preferred embodiments thereof are described in detail above.

Examples

Example 1

[0054] Sylvagel 5100 (3 wt.%, obtained from Arizona Chemical Company) was added gradually to GTL Gasoil (obtained from Shell) at 100°C under continuous agitation. The obtained clear and homogeneous solution was cooled down to ambient temperature. A thickened product with thixotropic properties was obtained.

Example 2

[0055] Sylvagel 5100 (5 wt.%, obtained from Arizona Chemical Company) was added gradually to GTL Gasoil (Shell) at 100°C under continuous agitation. The obtained clear and homogeneous solution was cooled down to ambient temperature. A thickened product with thixotropic properties was obtained.

[0056] The products obtained by Examples 1 and 2 were very suitable as fire lighter composition, e.g. for lighting a wood fire and for lighting a barbecue.

Claims

1. Use of a Gas-to-Liquids gas oil (GTL gas oil) in a combustible composition, wherein the combustible composition is a lamp oil composition or a fire lighter composition. 5
2. Use according to claim 1, wherein the GTL gas oil has a cetane number of 65 or higher, as determined by ISO 5165. 10
3. Use according to claim 1 or claim 2, wherein the GTL gas oil has an initial boiling point of 120°C and a boiling range of 120 to 400°C. 15
4. Use according to any one of claims 1 - 3, wherein the GTL gas oil has an initial boiling point of 150°C and a boiling range of 150 to 380°C.
5. Use according to any one of claims 1 - 4, wherein the combustible composition comprises 80 wt.% or more of the GTL gas oil. 20
6. Use according to any one of claims 1 - 5, wherein the combustible composition comprises 98 wt.% or more of the GTL gas oil. 25
7. Combustible composition comprising a Gas-to-Liquids gas oil (GTL gas oil) and a thickening agent. 30
8. Combustible composition according to claim 7, wherein the GTL gas oil has a cetane number of 65 or higher, as determined by ISO 5165.
9. Combustible composition according to claim 7 or claim 8, wherein the GTL gas oil has an initial boiling point of 120°C and a boiling range of 120 to 400°C. 35
10. Combustible composition according to any one of claims 7 - 9, wherein the GTL gas oil has an initial boiling point of 150°C and a boiling range of 150 to 380°C. 40
11. Combustible composition according to any one of claims 7 - 10, wherein the combustible composition comprises 80 wt.% or more of the GTL gas oil. 45
12. Combustible composition according to any one of claims 7-11, wherein the thickening agent is selected from the group consisting of polyolefins and polyamides. 50
13. Fire lighter composition comprising a combustible composition according to any one of claims 7-12. 55



EUROPEAN SEARCH REPORT

Application Number
EP 12 19 5068

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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