

/EPA-: 259 809 ~~disobey~~

, a lubricating oil composition comprising 97 to 60% by weight of mineral oil and 3 to 40% by weight of polyester, said mineral oil having a dynamic viscosity at 100°C of 2 to 50 centistokes, a pour point (as determined by JIS K-2269) of -5 to -30°C, a viscosity index (as determined by JIS K-2283) of not less than 80 and % C_A of not more than 3. This lubricating oil composition is suitable for lubrication of parts including a wet brake and a wet clutch, such as automatic transmissions and tractors.

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LUBRICATING OIL COMPOSITIONS

The present invention relates to environmentally friendly lubricating oil compositions for automotive engines. Lubricating oil compositions for use in automotive engines are well known. <-7 These compositions usually contain a base fluid which may comprise mineral oils, hydrocarbon oils and/or synthetic fluids and conventional additives such as viscosity index (hereafter "VI") improvers, anti-oxidants, corrosion inhibitors, dispersants, anti-wear additives and sludge control agents. In recent years, automotive engine oil development has seen a steady trend towards lower viscosity multigrades, principally to improve fuel efficiency. The predominant viscosity grade has moved from a typically 20W/50 oil to a 10W/40 or a 5W/40 oil. The manufacturers of automotive engine equipment have also tightened the specifications for such oils in terms of oil consumption, bearing protection and shear stability. This has meant that the engine lubricant has had to become lower in volatility and more shear stable so that these thinner oils stay in the specified grade band longer. As a result, lubricating oils compositions based solely on conventional solvent refined mineral oils are no longer adequate to meet these stringent performance requirements. To meet these performance requirements, a growing demand has arisen for "special" base oils possessing superior qualities of volatility, VI and pour point. These special base oils have a VI above 120 and the requirement is primarily met by the use of paraffinic base oils which include inter alia oils based on hydrocracked wax

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distillates. It has also been suggested to use blends of such hydrocracked wax distillates with aliphatic esters in order to improve the performance of such base oils. These prior art compositions usually contain 80%w/w or more of a hydrocarbon or mineral oil and upto 20%w/w of an aliphatic carboxylic acid ester in the base fluid. Such compositions, whilst being very efficient and being to some extent biodegradable, still leave room for improvement.

It has now been found that base oil blends can be formulated which not only improve the biodegradability thereof but achieve the same without loss of performance at the same time exhibiting relatively lower emissions, lower fuel consumption and lower oil consumption.

Accordingly, the present invention is an automotive engine lubricating oil composition which has a major proportion of a base fluid which fluid comprises a blend of:

- a) isotridecyl dodecanedioate
- b) at least one hydrocarbon oil comprising upto 99.5%w/w of aliphatic hydrocarbons and no more than 10%w/w aromatic hydrocarbons such that the total of aliphatics and aromatics is 100% wherein the amount of component (a) in the blend is in the range from 25-55%w/w.

As described above, the base fluid comprises a blend of an ester and a hydrocarbon oil. The ester component (a) is derivable by the reaction of an aliphatic mono-, di-and/or poly-carboxylic acid with, isotridecyl alcohol under esterification conditions.

Specific examples of such esters include the isotridecyl esters of octane-1,8-dioic acid, 2-ethylhexane-1,6-dioic acid and dodecane-1,12-dioic acid.

Similarly, the hydrocarbon oil component (b) in the blend suitably is a hydrocracked wax distillate. More specifically, such hydrocarbon oils can contain upto 99.5%w/w, preferably upto 97%w/w, of aliphatic hydrocarbons and no more than 10%w/w of

The formulation was prepared using standard lubricant blending techniques described e.g. in "Lubricants and Related Products" by D Klamann, published by Verlag Chemie, 1984.

The formulated composition had the following characteristics:

<u>Property</u>	<u>Limits</u>	<u>Methods</u>
Viscosity @ 100°C	13.6-14.5 cSt	ASTM D 445
Viscosity @ 40°C	75.0-83.0 cSt	ASTM D 445
Viscosity @ -25°C	<3500 cP	ASTM D 2602
Noack volatility	8.5-11.0%	DIN 51581
Biodegradability	>80%	CEC-L-33-T-82
Calcium	0.300-0.332	ICP
Phosphorus	0.102-0.114	ICP
Zinc	0.105-0.135	ICP

Example 2

SH Additive Package (eg OS 99099, ex Lubrizol Ltd)	- 15% w/w
Viscoplex* 2540 (VI Improver, ex Rohm GmbH)	- 3.0% w/w
Shellvis* 201 (VI Improver, ex Shell UK Ltd)	- 3.8% w/w
Isotridecyl dodecanedioate	- 38.1% w/w
Hydrocarbon oil (as above)	- 40.1% w/w

*Registered Trade Mark

The formulated composition had the following characteristics:

<u>Property</u>	<u>Limits</u>	<u>Method</u>
Viscosity @ 100°C	14.0 cSt	ASTM D445
Viscosity @ -25°C	3200 cP	ASTM D2602
Noack volatility	10.7%	DIN 51581
Biodegradability	87%	CEC-L-33-T-82
Calcium content	0.283	ICP
Phosphorus content	0.119	ICP
Zinc content	0.128	ICP

Example 3

SG Additive Package (eg GBX2905, ex Adibis Ltd)	- 16.4% w/w
Flexol* 1420 (VI Improver, ex Rohm GmbH)	- 3.1% w/w
GBX 2715 (VI Improver, ex Adibis Ltd)	- 5.0% w/w
Isotridecyl dodecanedioate	- 40.0% w/w
Hydrocarbon oil (as above)	- 35.5% w/w

*Registered Trade Mark

Druckexemplar

Case 7936(2)

Claims:

1. An automotive engine lubricating oil composition which has a major proportion of a base fluid which fluid comprises a blend of:
 - a) isotridecyl dodecanedioate, and
 - b) at least one hydrocarbon oil comprising up to 99.5%w/w of aliphatic hydrocarbons and no more than 10%w/w of aromatic hydrocarbons such that the total of aliphatics and aromatics is 100%, wherein the amount of component (a) in the blend is in the range from 25-55%w/w.
2. A lubricating oil composition according to claim 1 wherein the hydrocarbon oil component (b) is a hydrocracked wax distillate.
3. A lubricating oil composition according to claim 1 or claim 2 wherein the hydrocarbon oil component (b) contains less than 10ppm of polycyclic aromatic hydrocarbons, from 92-97%w/w of aliphatic hydrocarbons and 3-8%w/w of aromatic hydrocarbons.
4. A lubricating oil composition according to any one of the preceding claims wherein the aliphatic hydrocarbons in the hydrocarbon oil component (b) comprise about 20%w/w of isoparaffins having an average carbon number of about 27.
5. A lubricating oil composition according to any one of the preceding claims wherein the isotridecyl dodecanedioate is present in the blend in the range from 30-50%w/w.
6. A lubricating oil composition according to any one of the preceding claims wherein said composition comprises, in addition, minor proportions of one or more additives selected from: sludge

dispersants, ashless dispersancy agents, VI improvers, anti-wear additives, anti-rust agents and anti-oxidants.

7. A lubricating oil composition according to claim 6 wherein the anti-rust agent is an overbased calcium or magnesium sulphonate or phenate; the anti-wear agent is a zinc dithiophosphate; the ashless dispersancy agent is a long chain hydrocarbon substituted succinimide; the sludge dispersant is an oil soluble salt such as amides, imides, oxazolines and esters of mono- or di-carboxylic acids or anhydrides; the anti-oxidant is a phenolic compound; and the VI improver comprises a polymethacrylate dispersant or a hydrotreated polyisoprene.

8. A lubricating oil composition according to any one of the preceding claims wherein said composition is at least 80% biodegradable as measured by the ^{<-7} standard test procedure.

<-7 = <CEC-L-33-T-82>