United States Patent Office 3,752,766
Patented Aug. 14, 1973



3,752,766

# AUTOMOTIVE ADDITIVE

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No Drawing. Filed Dec. 14, 1970, Ser. No. 98,194
Int. Cl. C10m *1/20, 1/24*
U.S. Cl. 252—57 6 Claims

## ABSTRACT OF THE DISCLOSURE

A composition suitable for use as an additive to motor oils, as a motor oil substitute, and/or as a fuel additive comprising a polyalkylene glycol, a hydroxyl-containing aromatic ester, a lower alkanol, a naturally derived aromatic ketone, 3-p-menthanol, and a dyestuff which composition is superior to conventional oils and/or fuels with regard to the amount pollutants generated therefrom as a result of the use thereof in an internal combustion engine.

## BACKGROUND OF THE INVENTION

### (1) Field of the invention

The subject application is directed to a novel composition which is particularly designed for use in connection with the operation of internal combustion engines. In particular, the subject composition is useful either as a substitute for a lubricating oil, as a lubricating oil additive, and/or as a fuel for use in connection with such engines.

### (2) Description of the prior art

Ecology in general, and the pollution of our environment which effects such ecology has become a matter of national concern towards which the efforts of government on all levels including the federal, state and local governments of our country are directing a great deal of attention. Each day a new commission is established to study the effects of the day to day use of numerous products which we have in the past taken for granted, inasmuch as they have served to make our lives easier. Particular attention has been directed toward discussing the numerous sources of pollutants which are daily infiltrating the air which we breath. As a result of such efforts, it has become very apparent that there are several contributing factors which are presently very seriously effecting the ecological balance as a result of the addition of unnatural and/or synthetic materials to the air. Inasmuch as most of the above-indicated efforts have shown that the pollution of the air is of critical importance with regard to our continued existence, numerous efforts have been made to define those factors which are contributing most of such pollution, and further to correct same.

As a result of such efforts, there have been several indications that the use of the internal combustion engine, in automobiles is the largest contributing factor to air pollution in this country. As a result of the use of automobiles, trucks and similar conveyances, materials such as carbon monoxide, hydrogen sulfide, hydrocarbon residues and the like are constantly added to the air either because of the inefficiency of the engine means employed in connection therewith, or as a result of our inability to provide suitable fuels therfor which would eliminate such inefficient combustion. Moreover, in addition to the contaminants derived from fuels utilized in connection with such engines, further contamination has resulted from the lubricants conventionally therewith.

Such engines must, of course, be lubricated, in light of the heat and friction which occur during the use thereof. If one were to eliminate lubricants from the internal structures of such an engine one would cause the engine



to fail just as quickly as if fuel were withdrawn therefrom. That is to say, that the subject invention is directed to both major sources of pollution which result from the use of automobiles, trucks and other conveyances as a result of the power source utilized in connection therewith.

In light of the serious concern presently generated with regard to pollution, numerous attempts have been made in the past to provide both fuel and/or lubricating substitutes which would eliminate this primary cause of pollution. Such efforts have, however, been unsuccessful either as a result of the high costs of such additives thus, inhibiting the commercial success thereof and/or the failure of technology to develop a suitable combination of materials which serve similar and/or identical functions with regard to the materials which they are designed to replace. That is to say, the manufacture of synthetic fuels is by the very nature of the fuel which they are to replace a very complex and difficult task. Internal combustion engines are designed to operate as a result of the combustion of a fuel such as gasoline which results in the forced movements of the various parts contained therein. In order to be a suitable substitute, particularly for use in connection with presently existing engines, a synthetic material must substantially duplicate the characteristics and properties of presently employed hydrocarbon derivatives. Moreover, it is noted that a synthetic material must substantially duplicate the properties and/or actions of presently available hydrocarbon derivatives at a reasonable cost in order to be commercially successful. As a result of the foregoing considerations, the manufacture of synthetic additives and/or replacements has become an increasingly difficult task towards which many millions of dollars of research money have been directed.

## SUMMARY OF THE INVENTION

As previously noted the subject invention is directed to a material which overcomes the numerous difficulties previously associated with the preparation of synthetic fuels and/or lubricants and, therefore, it is an object of the instant invention to provide a synthetic material which will substantially replace fuels and/or lubricants presently used in connection with automotive engines.

Another object of the instant invention is to provide a composition which is useful as an additive to presently existing automotive fuels and lubricants.

Yet another object of the instant invention is to provide a composition which is substantially free of hydrocarbons which upon combustion pollute the air which composition serves as a fuel and/or lubricant for an internal combustion engine.

A still further object of the instant invention is to provide a composition comprising a polyalkylene glycol base which is suitable for use either as a replacement for or as an additive to internal combustion engine fuel and/or lubricant.

These and other objects of the instant invention will become more evident from the following more detailed description thereof.

As previously noted, the subject invention is directed to a composition which is particularly designed for use in connection with internal combustion engines. It has unexpectedly been found that the subject composition serves both lubricating and fuel functions while drastically reducing the deleterious pollutants which results from the operation of such engines. Therefore, such composition represents a substantial step forward in the fight against pollution which is of such grave concern to all of us at this time.

As previously noted, the subject composition comprises a polyalkylene glycol, an hydroxyl-containing aromatic

ester, a naturally derived aromatic ketone, 3-p-menthanol, a lower alkanol, and suitable dyestuffs. The subject polyalkylene glycols are, in general, mixtures having a relatively high average molecular weight and further comprise molecules containing polyalkylene chains formed predominantly of oxyethylene groups, —$OC_2H_4$—, and the oxy 1,2-propylene group, —$OC_2H_3CH_3$—. Moreover, such polyalkylene glycols are generally considered to be mixtures of true monohydroxy aliphatic alcohol to a mixture of alkylene oxides containing ethylene oxide and 1,2-propylene oxide in an oxide ratio of from 75–25 to 10–90 ethylene oxide-1,2-propylene oxide. Such oxide ratio is defined to mean that in the oxide mixture which may be used in forming such monohydroxy alcohol addition products, the amount of 1,2-propylene oxide in the mixture is from ⅓ to 9 times the amount of ethylene oxide present by weight, the parts are proportion of the 1,2-propylene oxide being given last.

## DETAILED DESCRIPTION OF THE INVENTION

The polyalkylene glycols are prepared by a reaction which takes place between the alcohols, the ethylene oxide, and the 1,2-propylene oxide which would appear to be a simple addition wherein the alkylene oxide molecules undergo conversion to the corresponding oxyalkylene radicals.

From such properties as the average molecular weight, refractive index, density, viscosity with change in temperature, as well as upon theoretical conditions its appears that these products are complex mixtures of monohydroxypolyoxyalkylene aliphatic monoethers having polyoxyalkylene chains of different lengths and different internal configurations with the hydroxyl group appearing at one end of the chain and the aliphatic group of the starting alcohol at the other, and further containing in the single molecules both the oxyethylene group and the oxy 1,2-propylene group.

By way of illustration, the molecular weights of the oxyethylene-oxy 1,2-propylene chains of compounds having 5 oxyalkylene groups to the molecule would be 234, 248, 262, and 276 respectively exclusive of the alcohol depending on whether 1, 2, 3, 4, oxy 1,2- propylene groups are present therein; and in a mixture of such compounds the average molecular weight attributable solely to the oxyalkylene chain would be between 234 and 276 with the oxide ratio corresponding thereto being between 75.2–24.8 and 15.9–84.1. Similarly, the molecular weights of the oxyethylene-oxy 1,2-propylene chains of the compounds having six oxyethylene groups to the molecule with 2, 3, 4 and 5 oxy 1,2-propylene groups present therein would be 292, 306, 320 and 334, respectively; and in mixtures of such compounds the average molecular weight attributable solely to the oxyalkylene chain would be between 292 and 334 with an oxide ratio between 60.3–39.7 and 13.2–86.8 corresponding thereto. Compounds having a singular oxypropylene group are omitted since their oxide ratio falls below the 75–25 limit. In compounds having a total of 7 oxyethylene and oxy 1,2-propylene groups to the molecule, of which the number of oxy 1,2-propylene groups are 2, 3, 4, 5, and 6, the molecular weight of the polyoxyalkylene chain would be 336, 350, 364, 378 and 392 respectively; and in mixtures of such compounds the average molecular weight attributable solely to polyoxyalkylene chain would be between 336 and 392, with an oxide ratio of between 65.5–34.5 and 11.2–88.8 corresponding thereto. Likewise, in compounds having 2, 3, 4, 5, 6 and 7 oxy 1,2-propylene groups in an oxyethylene oxy 1,2-propylene chain of 8 oxyalkylene groups the molecular weights of such chains would be 380, 394, 408, 422, 436 and 450 respectively with the average molecular weight attributable to the polyoxyalkylene chain in a mixture of such compounds being between 380 and 450, and the oxide ratio corresponding thereto being between 69.5–30.5 and 9.8–90.2. To each of the foregoing values for molecular weights and average molecular weights there is to be added a value not less than 32, i.e., the molecular weight of methanol the lowest member of the aliphatic alcohol series.

A product containing an admixture of the monohydroxy aliphatic monoethers of the foregoing polyoxyalkylene chains having proportions between 75–25 and 10–90 would have as many as 19 constituents (exclusive of isomers) which differ from one another in the molecular weights attributable to polyoxyalkylene chains yet which have a spread of only from 5 to 8 oxyalkylene groups between the smallest and largest molecules, and a spread of from 266 to 482 in the molecular weights of the methylmonoethers. The complexities of the mixture may be due not only to the difference in molecular weights of the chains but also to the large number of isomers which may be formed by random (i.e., interspersed) distribution of the oxyethylene and oxy 1,2-propylene groups, with constant variations in internal configuration from molecule to molecule which complexity increases with the molecular weight. Moreover, such products may be referred to as mixtures of monohydroxy heterized oxyethylene oxy 1,2-propylene aliphatic monoethers. The term "heterized" is defined to mean that the monoethers vary in internal configuration from molecule to molecule, such variation arising out of the randomness of the distribution of the oxyethylene and the oxy 1,2-propylene groups therein such as results for instance, from the concurrent reaction of ethylene oxide and 1,2-propylene oxide with an aliphatic monohydroxy alcohol.

Using ethylene oxide-1,2-propylene oxide ratios of from 75–25 to 10–90 by weight and starting alcohols having 1, 2, 3, 4 and more carbon atoms to the molecule, numerous products have been manufactured having an average molecular weight ranging from about 500 to upwards of 5,000. Such polyalkylene glycols are normally obtained as liquid products which are characterized by having a relatively low change of viscosity with change in temperatures; the actual viscosity of the product as well as the other properties such as density, refractive index, and the like being dependent solely on the starting materials, the oxide ratio, and the average molecular weight. For a given starting alcohol and oxide ratio the viscosity, density, and refractive index increase with molecular weight, and for alcohols having from up to 14 or more carbon atoms and for oxide ratios from 75–25 to 10–90, the viscosities at a given temperature appear to lie in a relatively narrow band or zone which, at a temperature of 210° F., extends from 3 to 10 centistokes at an average molecular weights of about 500 to 800, up to 20 to 50 centistokes at average molecular weights of about 1500 to 2000. For oxide ratios of from 50–50 to 10–90, at a temperature of 20° F., the viscosities extend from 150 to 500 centistokes at average molecular weights of about 500 to 800, up to 1500 to 5000 centistokes at average molecular weights of 1500 to 2000.

In general, products containing a preponderance of 1,2-propylene oxide are preferred for use in connection with this invention. With an increase in the 1,2-propylene oxide content the water tolerance of the product decreases and those products having an oxide ratio of about 25–75, for instance, are substantially immiscible with water, even at low temperatures; with the possible exception of low average molecular weight compounds. Moreover, due to the difficulties incumbent in maintaining absolutely dry conditions, the subject polyalkylene glycols may have present therein in small amounts lower molecular weight compounds, on the order of about 500–600 or less, and moreover, the presence of such glycols may indicate an apparent water miscibility of the product which is not truly characteristic of the monoethers of which it is essentially composed. Those polyalkylene glycols made from mixtures having oxide ratios of from about 50–50 to 10–90 which as noted are the preferred compounds for use in connection with the instant invention are also characterized by the very useful property of remaining in the

fluid state at extremely low temperatures, for instance, at temperatures as low as —50° C., and below. The temperature at which solidification of such compounds takes place increases with the increase in the ethylene oxide content above 50%. Therefore, as noted, those compounds having less than 50% ethylene oxide are much preferred for use in connection with the instant invention.

The ethylene oxide-1,2-yropylene oxide mixtures utilized in connection with the compositions of the instant invention may be prepared by bringing an ethylene oxide-1,2-propylene oxide mixture into intimate contact with a monohydroxy alcohol starting material in a liquid phase throughout which a suitable catalyst is uniformly dispersed. For best results, it is essential that the addition reaction be carried out under conditions which are closely controlled with respect to such factors as the amount of catalyst employed and the uniformity of its dispersion, the amount of unreacted alkylene oxides present at any stage during the reaction, the temperature maintained throughout the course of the reaction, and the intimacy and uniformity of contact of the reacting oxides with the reactants to which they are to be added.

Catalytic materials preferred for use in the preparation of such compositions are sodium hydroxide or potassium hydroxide in an amount of from about 0.2 to about 1% by weight of the total amount of the reactants, including the ethylene oxide and 1,2-propylene oxide appearing in the reaction product. An amount of active catalyst within this range is not so large as to cause excessive decomposition of the alkylene oxide addition product of the main reaction, and further excellent results have been obtained with an amount of sodium hydroxide which is about 0.75% by weight of the reactants. The term active catalysts as utilized herein is meant to define the amount of catalyst present which has an alkalinity of the order of the alkali metal hydroxides, excluding such compounds of substantially less alkalinity as the carbonates and carboxyl acid salts which may be titratable as the hydroxide. In addition to alkali metal hydroxides one may also employ the corresponding alcoholates thereof. In general, the stronger the alkalinity of the catalyst, the less one need employ in the reaction process. All of the catalysts, need not be added at the start of the reaction, and portions thereof may be added at the start with the remainder of the catalysts being added from time to time throughout the course thereof so as to maintain a substantially constant catalysts concentration.

Some of the reaction conditions, such as, for example, high reaction temperature, would appear to favor the formation of glycols of low molecular weight, and any tendency toward glycol formation may become more pronounced the higher the reaction temperature. The oxyalkylene glycols thus formed are in small amount of the preferred reaction conditions, however, and may be removed by a subsequent treatment, such as, for example, distillation, extraction or both.

The reaction should be carried out at a temperature which is sufficiently high to favor reaction of the alkylene oxides. A rapid reaction rate reduces the time of exposure of the oxide to the catalyst and the surfaces of the reaction vessel, therefore, decreasing the possibility of isomerization, and the formation of side reaction products. With the preferred alkaline catalysts, dry sodium hydroxide or potassium hydroxide or the corresponding alcoholates thereof, reaction temperatures of from about 80° C. to about 160° C. have been used. At such temperatures products possessing excellent properties for use in the subject lubricating and/or fuel additive compositions which do not deposit sludge, gum- or lacquer-film forming materials, or corrode metal parts when used therein have resulted.

It is further noted that preferably one avoids an excessive concentration of underreacted alkylene oxides in the reaction zone, especially in the presence of the strongly alkaline catalysts such as sodium hydroxide, potassium hydroxide, or the alkali metal alcoholates. It is preferred to supply the ethylene oxide and 1,2-propylene oxide to the reaction zone at such a rate which enables one to maintain a control concentration of unreacted oxides which is substantially uniform or constant to the end of the reaction. To this end, the reaction is preferably performed in a closed system and said oxides are introduced at a rate which maintains a substantially uniform pressure therein. Said pressure should be maintained at about 5 to 50 p.s.i., although under other conditions pressures as high as 200 p.s.i. may also be employed. It is also noted that a nonreactive gas, such as, for example, nitrogen, may be utilized to assist in maintaining such pressure. Furthermore, it is suggested that the liquids in the reaction vessel either be cycled and/or agitated vigorously so as to wash the walls thereof and assist in maintaining the intimate contact and uniform concentration of the reactants. Because the presence of oxygen tends to favor the formation of side reaction products, the reaction vessel should be exhausted or the air swept out therefrom, with gaseous nitrogen or the like prior to charging the reactor.

It is also noted that a more stable composition results if the monohydroxy heterized oxyethylene 1,2-propylene aliphatic monoether products utilized therein have a low ash content so as to diminish and/or void such formation and the deposition of carbon. The ash contents of the addition product may be derived from the catalyst used in making same, and also from any ash forming inorganic impurities present in the reactants or acid substances present in the reaction mixture. In removal and/or absence of low molecular weight glycols and the water associated therewith, greatly decreases the solubility of such ash forming impurities and, therefore, the subject heterized monoether products are relatively free from such impurities.

For best control, it is desirable to carry out the oxide addition under relatively moisture free conditions, and to avoid side reactions which form water. Therefore, the dry reaction vessels and connections are preferably swept out with dry oxygen free gas as noted above prior to introducing the charge. The catalyst should also be dry or substantially so. The ethylene oxide and 1,2-propylene oxide should preferably be purified to remove the moisture and impurities therefrom which moisture and impurities are capable of entering into side reactions which yield water. Moreover, compositions of superior stability, with an average molecular weight of about 1,000 to 3,500 or higher, and which have only relatively small amounts of polyoxyalkylene glycols of a molecular weight of about 500–600 and lower, are produced when the moisture content of the oxides does not exceed about 0.1% by weight. For best results, a low ash content and good stability are required, and, therefore, a moisture content of less than 0.05% is desirable. It is recognized, however, that there may be a minimum amount or trace of moisture which is essential, and below which it is undesirable to go.

Alkaline oxides of a desired degree of dryness may be obtained by distilling same through an efficient rectifying column or from solution in a hygroscopic glycol or the like, for instance, ethylene glycol, diethylene glycol, propylene glycol or the higher members of the glycol series. The oxide vapor may also be scrubbed by means of a hygroscopic liquid and the like.

When a strongly alkaline catalyst such as, for example, sodium hydroxide is employed, it is also preferred to neutralize said catalyst upon completion of the reaction, with an acid which will react with the catalyst to form a salt having characteristics which favor its removal from the reaction product. To this end sulfuric acid and carbon dioxide have been employed with said sulfuric acid being utilized in its dilute aqueous form. When neutralizing the catalyst, it is also desirable to form salts which are insoluble in the reaction product after stripping it of the

low boiling constituents, and which may be removed mechanically as by filtering at a relatively high temperature.

Impurities other than inorganic salts which may be formed in the reaction products under some conditions may include, for instance, water soluble materials which are not the monohydroxy aliphatic monoethers utilized herein. Because of the relatively high molecular weight of said monoethers, they cannot be readily distilled in ordinary vacuum equipment, and for the removal of the water soluble impurities it may be desirable to carry out an extraction step, preferably prior to the stripping operation. Water, or an aqueous salt solution may be utilized as the extractant. Such an extraction may be carried out advantageously at moderately elevated temperatures of from about 50° C. to 95° C., or higher and under pressure if need be, because of the decreased miscibility of the product with water and aqueous salt solutions at such temperatures, especially with products of higher oxyethylene content. In carrying out the extraction it has also been found that the effect of sodium carbonate in favoring the formation of two phases is quite marked and that in many cases, two phases may be formed at normal room temperature by saturating an aqueous solution with sodium carbonate or potassium carbonate. When two phases have developed by heating or salting out, an appreciable amount of the monohydroxy addition product may remain in the water or extract phase. Some of the water may also remain in the raffinate stage. Upon adding a third component which is a solvent for the product but a non-solvent for the water, the product solvent phase will contain less water, and less product will be present in the extract phase. Solvents which are suitable as assistants in making such extractions are dichloro diethyl ether, dibutyl ether, butanol, hexanol, toluene, benzene, ethylene dichloride, and the like. By dissolving the product in such a solvent and washing the resultant solution at a temperature of about 95° to 98° C. with successive small portions of water, a substantially ash free raffinate may be obtained with but slight loss of product. Subsequent to removing the solvent from the raffinate or solvent product phase, by distillation or the like, the residue may be stripped of low boiling constituents by heating same under a reduced pressure which may be as low as about 1 or 2 millimeters of mercury and at an elevated temperature which may reach 180° C. or higher. The use of a solvent is especially suitable in extracting those products which do not readily form two phases on heating with aqueous solutions to about 100° C. Materials appearing in the extract or aqueous phase may be recovered by removing the water, as by distillation, and filtering the residue to remove the salt therefrom. When the extraction is properly carried out, the stability of the raffinate and its freedom from corrosive action allows for the preparation of a unique lubricating and/or fuel substituted or additive.

It is also noted that one may prepare the monoethers utilized in the subject composition with catalysts other than alkali metal hydroxides. Boro and trifluororide for instance may be utilized in making such products having an average molecular weight of up to about 1,000. Products having an average molecular weight above this value are not readily prepared with boro and trifluoride and if so prepared, the products therefrom though useful have properties which differ somewhat from those of the caustic catalyzed products which are preferred for use in the subject compositions. In low concentrations, boro and trifluoride is also more active as a catalyst than sodium hydroxide, and an amount of the trifluoride which is about 0.15 to 0.5% of the total weight of the reactants may be used with good results. A uniform concentration of about 0.15%, however, is preferred. With said boro and trifluoride catalysts, reaction temperatures of from about 50° to 130° C. have been used with good results, but, preferably a temperature of about 70° to 90° is employed. It is also noted that the corrosive action of the boro and trifluoride on metal equipment and also the possibility of side reactions may be avoided by the addition of small amounts of calcium oxide to the reactants. Upon completion of the reaction, the neutralization of the catalysts by adding lime in th presence of water results in the formation of salts which may be removed by filtering and/or extraction. In the event the boro and trifluoride catalyzed product is desired for use in the composition of the instant invention it is highly desirable to remove the fluorine therefrom so as to provide an ultimate composition having superior stability.

In particular, the polyalkylene glycols which are considered particularly useful in connection with the instant invention have an ethylene oxide-1,2-propylene oxide ratio of from about 50–50 to about 10–90. They may vary in certain basic characteristics properties and may be generally designated by their visosity in Saybold Universal Seconds (SUS) at 100° F. which ranges from about 50 to more than 300,000. The subject compounds show less change in viscosity with temperature than do petroleum oils and further represent an advantage thereover in light of the fact that they can be specifically controlled and varied with a degree not possible with naturally occuring, refined hydrocarbon lubricants. The viscosities of the subject compounds may vary from about 135 to about 155 (A.S.T.M. D.567). Moreover, the subject polyalkylene glycols have low stable pour points and are extremely chemically stable compounds which under conditions of high temperature and the like do not tend to break down. Furthermore, when said compounds od disintegrate they tend to form soluble fluids or volatile products as distinguished from sludge or varnish which is conventionally associated with the degradation of lubricants and/or fuels. In addition, it is noted that the subject compounds are free from carbon or coke and thus, as previously noted, they do not contribute to the pollution of our environment and as a result of such freedom from carbon and coke the subject polyalkylene glycols in the presence of air result in an extremely clean burn-off.

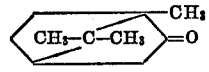
It is further noted that said polyalkylene glycols have, in addition to the above-noted advantages, further advantages including their non-corrosive nature to the internal parts of an internal combustion engine, their unreactive nature with rubber which comprises the majority of gas surfaces and the like.

The particular polyalkylene glycol utilized in connection with the instant invention may be determined based upon commercial, and ultimate purpose requirements. That is to say, that anyone of numerous polyalkylene glyuols within the above-noted classification may be employed in connection herewith. Such materials should preferably, however, be water-insoluble and have a viscosity index of approximately from about 140 to 145 (A.S.T.M. D.567). Moreover, such compounds should have a viscosity in Saybold Seconds at 210° F., of from about 50 to about 80, and from about 200 to about 500 at 100° F. Moreover, at 0° F., such compounds should have a viscosity in Saybold Seconds of from about 15,000 to about 30,000. It is also preferred that the subject polyalkylene glycols have a pour point of from about 0 to about −50° F. and a density of from about 0.9 to about 1 at temperatures of from about 60° F. to about 210° F. Still further such polyalkylene glycols should have a coefficient of expansion of from about 0.00040 to about 0.00050 per degree Fahrenheit and a water content of less than 0.25 percent.

It is preferred, however, to employ in a lubricant or lubricant-additive composition those polyalkylene glycols having a relatively low viscosity while employing those polyalkylene glycols with a high viscosity in connection with fuel substitutes and/or additives.

The second ingredient of the subject composition is a naturally derived aromatic ketone which is preferably, derived from Cinnammomum camphora. Such a ketone

has a molecular weight of approximately 152.2 and occurs as a colorless white crystals, granules, or crystalline masses. Moreover, such a ketone has a specific gravity of approximately 0.99 and is slowly volatile at room temperature, has a solubility of approximately 1 to 10 in hexane and a melting point of from about 174° to 179°. Representative of such a ketone is a compound having the formula:

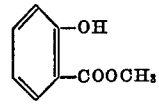


3-p-methanol is the third component of the subject composition, which compound has a molecular weight of approximately 156.27 and occurs as colorless hexanol crystals. Moreover, the compound has a melting range of from about 41° to about 43° and is freely soluble in organic solvents.

The fourth components of the subject invention comprises an hydroxyl-containing aromatic ester having the general formula:

$$A(X)_a(OR)_b$$

wherein A represents an aromatic nucleus, X is a carboxyl substituent, R is a substituent selected from the group consisting of hydrogen, hydroxy alkyl, hydroxyl and the like and *a* is a whole number of at least 1 and *b* is zero or a whole number. Preferably, however, the subject hydroxy-containing aromatic ester has a formula:



which compound has a molecular weight of 152.

Moreover, as previously noted, the subject composition, in addition to the foregoing ingredients, also contains a lower alkanol. Representative of useful alkanols, are those containing from 1 to 4 carbon atoms such as methanol, ethanol, propanol and butanol, along with the iso forms thereof. Preferably, however, one employs methanol in the subject compositions both for reasons of cost and in addition because of its superior combustion with regard to the remaining alkanols.

In connection with the subject composition, one may employ from about 10 to about 50% polyalkylene glycol and, preferably, from about 15 to about 30% by weight thereof. The remaining three ingredients with the exception of the alkanol should be present in an amount of from about 0.01% to about 1% by weight of the total composition. Preferably, however, one employs from about 0.3 to 0.8% of each of said ingredients. The remainder of the composition is comprised mainly of the alkanol, small portions of which may be substituted for further additives such as dye-stuffs, anti-foaming agents and other conventional lubricative and fuel additives.

The subject composition may be prepared by solubilizing the hydroxy-containing aromatic ester, naturally derived ketone, and 3-p-menthanol in the lower alkanol and subsequently combining the resulting mixture with the polyalkylene glycol. The subject compositions may then, as noted above, be utilized either as replacements for and/or as additives to either fuels and/or lubricants. In general, if one is formulating a fuel, the proportions set forth above are employed using a high viscosity polyalkylene glycol. As distinguished therefrom, if one is formulating a crankcase lubricant, one would employ a low viscosity polyalkylene glycol in amounts of from about 75 to about 98% of the total composition. Moreover, one would employ from about 1 to about 10% of the remaining three additives and approximately 30% of the lower alkanol.

Subsequent to formulation the subject compositions may be added directly to a lubricant oil and/or added to an engine as a replacement therefor or, as an alternative, may be injected into the carburetor throat using a suitable turbo-injector so as to form a vapor thereof which is combustible.

The instant invention will now be illustrated by the following more detailed examples thereof. It is to be noted, however, that the instant invention is not deemed as being limited thereto.

## EXAMPLE 1

A replacement for crankcase petroleum oil was prepared comprising 96% of a mixture of mono-ether polyalkylene glycols having a molecular weight of approximately 1,000 and an ethylene oxide-1,2-propylene oxide ratio of approximately 30/70, 5 cc. of 3-p-menthanol, 5 cc. of 2-camphanone, 5 cc. of methyl salicylate, 30 cc. of methanol (99.2% anhydrous) and 5 cc. of dyestuff. The composition was prepared by solubilizing each of the ingredients with the exception of the mono-ether polyalkylene glycol in the menthol and subsequently combining those so-solubilized products. The mixture may be used as a substitute and/or additive to crankcase oils so as to decrease pollution which results from the use of hydrocarbon residual oils.

## EXAMPLE 2

A fuel was prepared comprising 25% of a mono-ether polyalkylene glycol, having a molecular weight of approximately 900 and an ethylene oxide-propylene oxide ratio of approximately 50/50, 2½% methyl salycilate, 2½% 3-p-menthanol, 2½% 2-camphanone, dyestuff, with the remainder being methanol (99.2% anhydrous). The fuel mixture was prepared by solubilizing each of the ingredients with the exception of the mono-ether polyalkylene glycol in the methanol and subsequently combining the so-formed mixture with the polyalkylene glycol. The mixture which resulted was suitable for injection as a vapor into the carburetor of an internal combustion engine. Moreover, the resulting composition would result in a decreased pollution emission as a result of the use thereof as compared to gasoline.

## EXAMPLE 3

The preparation of Example 1 was once again prepared utilizing therein 75% of a mono-ether polyalkylene glycol having a molecular weight of approximately 1200 and an ethylene oxide-1,2-propylene oxide ratio of approximately 40/60 in lieu of the polyalkylene glycol employed therein. As a result of the above, a mixture which was found to be well suited for use as an additive to crankcase oils resulted.

## EXAMPLE 4

The procedure of Example 2 was repeated utilizing therein 1% 2-camphanone, 1% 3-p-menthanol, and 1% methyl salycilate. The mixture was formulated as in Example 3 and found to be a suitable fuel substitute.

Although the present invention has been adequately described in the foregoing specification and examples included therein, it is readily apparent that various changes and modifications can be made, without departing from the spirit and scope thereof.

What is claimed is:

1. A composition for reducing pollutants emanating from the exhaust of an internal combustion engine for use as a motor oil or motor fuel additive or motor oil substitute, which consists essentially of, in combination, a mixture of:

(1) a mono-ether polyalkylene glycol having an ethylene oxide to propylene oxide ratio of from about 75–25 to 10–90;

(2) an aromatic ketone derived from the plant Cinnamomum camphora, said ketone having a molecular weight of approximately 152.2 and a melting point ranging from about 174° C. to 179° C.;

(3) 3-p-menthanol;

(4) methyl salicylate; and

(5) a lower $C_1$–$C_4$ alkanol,

said mono-ether polyalkylene glycol being present

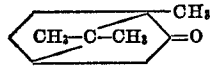
in an amount of from about 10 to about 50% by weight of the total composition and exhibiting a molecular weight ranging from 500 to 5,000, and

the remaining components of said composition with the exception of the alkanol being present in an amount ranging from about 0.01% to about 1.0% by weight of the total composition.

2. The composition of claim 1, wherein said hydroxyl containing aromatic ester is methyl salicylate.

3. The composition of claim 1, wherein said lower $C_1$–$C_4$ alkanol is methanol.

4. The composition of claim 1, wherein said aromatic ketone is a ketone having the formula:



5. In the process of operating an internal combustion engine utilizing a hydrocarbon lubricant therefor, the improvement which comprises substituting for at least a portion of said hydrocarbon lubricant, the composition of claim 1.

6. The process of claim 1, wherein said composition is substituted for all said hydrocarbon lubricant.

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U.S. Cl. X.R.

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