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# MINERAL OIL COMPOSITIONS CONTAINING AMIDIC ACIDS OR SALTS THEREOF

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No Drawing. Application October 2, 1952, Serial No. 312,844

16 Claims. (Cl. 252—33.6)

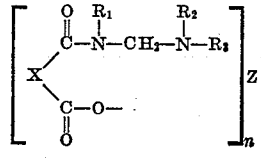
This invention relates to mineral oil compositions and particularly to improved mineral oil compositions which comprise a major amount of a mineral oil and a minor amount of an improvement agent sufficient to confer thereupon useful and advantageous properties, such as rust or corrosion prevention and other desirable properties.

With the advancing refinement of various devices in which mineral oils of the fuel and lubricant type are employed, increasingly severe demands have been made of the particular fuels or lubricants used therein. As is well known in the art, the "straight" or "uncompounded" mineral oils are often deficient in one or more respects for the particular use to which they are put. For example, a high resistance to rust or corrosion is important in the case of fuels or lubricants which are required to function in the presence of water. Fuels or lubricants for internal combustion engines and for gas or steam turbines and lubricants for various bearing members which are subjected to moisture are examples of mineral oil products which may operate under conditions highly conducive to rusting or corrosion.

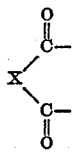
Failure to provide sufficient resistance to rust or corrosion by the mineral oil may result in extensive wear or damage to costly, highly machined moving parts. To overcome this and other deficiencies various agents known as "addition agents," "additives," or "improvement agents" are commonly incorporated into the particular mineral oil to be used.

An object of this invention is the provision of mineral oil compositions having improved rust and corrosion inhibiting properties as well as other desirable characteristics. Other objects appear hereinafter.

These and additional objects are accomplished by the present invention which includes new mineral oil compositions containing a major amount of a mineral oil and a minor, corrosion inhibiting amount of an agent having the formula



where



represents the acyl residue of a dicarboxylic acid capable of forming a cyclic acid anhydride, $R_1$ and $R_2$ represent radicals selected from the group consisting of acyclic aliphatic radicals having at least 8 carbon atoms, cycloalkyl, aryl, alkaryl and aralkyl, $R_3$ is selected from the group consisting of hydrogen and a radical of the same kind as $R_1$ and $R_2$, Z is selected from the group consisting of hydrogen and a salt-forming radical, and $n$ is an integer equal to the valence of Z.

In the accompanying description certain preferred specific embodiments of the invention and matters ancillary



thereto have been described. It is understood that these are by way of illustration only and are not to be considered as limiting.

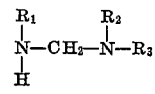
The various mineral oils in which the novel improvement agents may be incorporated include both the fuel and lubricant type. Examples of fuel type mineral oils are gasoline, kerosene, diesel fuel, and furnace oil. Examples of lubricant type mineral oils are engine oils, turbine oils, and greases. The invention also includes mineral oil compositions where the mineral oil constituent is not employed as a fuel or lubricant but merely as a solvent vehicle. Exemplary of this type of composition are light naphtha or like mineral oil solvents containing the novel additives of this invention.

The improved mineral oil compositions of the invention are conveniently prepared by simply dissolving a minor proportion, sufficient to confer corrosion-inhibiting properties on the composition, of the desired oil soluble improvement agent in the particular mineral oil to be used. Elevated temperatures may be employed to assist in dissolving the additive. Alternatively, the compounding of our mineral oil compositions may involve preparation of the additive in a mineral oil solvent to provide a concentrate of the additive. This concentrate may be dissolved subsequently in the particular mineral oil to be used. The latter method is preferred in view of the relative ease in obtaining a solution.

The novel additives of this invention, the chemical nature of which has been indicated above, may be conveniently designated as amidic acids or the substantially neutral salts thereof.

The preparation of these additives has been described fully in copending application Serial No. 312,843, filed in the names of Smith, Cantrell and Peters on October 2, 1952. For the sake of clarity, certain preferred methods of preparation have been set forth briefly below.

The preparation of the amidic acids of this invention involves the partial amidation at conventional conditions of a cyclic dicarboxylic acid anhydride with an N,N'-substituted methylene diamine having the formula



where $R_1$, $R_2$ and $R_3$ are as described above. This method is preferred, since the amidation reaction may be carried out at moderate temperatures which are less conducive to decomposition and polymerization. Products prepared according to this method are superior from the standpoint of color, purity, and oil-solubility.

Any cyclic dicarboxylic acid anhydride is suitable for the purposes of this invention. These substances, as known in the art, are capable of reacting with primary or secondary amines to form amides.

Cyclic acid anhydrides of aliphatic dicarboxylic acids are formed from acids having two carboxyl groups attached to adjacent carbon atoms or to carbon atoms separated by a third carbon atom. Examples of such acids are maleic, succinic, and glutaric acids. Alkyl substitution products of these acids, such as isopropyl succinic acid (pimelic acid) behave similarly as the unsubstituted acids. Aromatic dicarboxylic acid anhydrides such as O-phthalic acid anhydride are also suitable for the purposes of the invention.

The conditions of amidation may vary somewhat according to the particular starting materials. The reaction takes place satisfactorily at temperatures of about 200° F. Somewhat higher or lower temperatures may be used with no undesirable results. The reaction is normally complete in from about 60 to about 120 minutes, depending largely on the temperature employed.

The amidation reaction may be conducted simply by mixing equimolar proportions of the acid or anhydride and the N,N'-substituted methylene diamine and heating, or alternatively, by first dissolving the reactants in a solvent (preferably a mineral oil solvent) and conducting the reaction in solution. The amidic acid product may be recovered in the form of a solution, or alternatively, the solvent may be removed by evaporation to provide the amidic acid per se.

When a metal salt of the amidic acid is the desired final product, the amidic acid need not be prepared separately, but the methylene diamine, the dicarboxylic acid anhydride and a suitable metal hydroxide can all be reacted simultaneously. Thus, the alkali metal hydroxides and the alkaline earth metal hydroxides can be added directly to the reacting mass in the form of an aqueous solution or slurry. In the case of certain difficultly reacting metal hydroxides, the alkali metal salt of the amidic acid can be prepared as described above, and the amidic acid salt of the desired metal can be obtained by metathesis of such alkali metal salt and a water soluble salt of the desired metal.

Illustrative of metals which give desirable amidic acid salts according to this invention are sodium, lithium, potassium, barium, calcium, magnesium, strontium, lead, copper, iron, nickel, mercury, zinc, bismuth, aluminum, chromium, tin, manganese, silver and cadmium.

Amine or ammonium salts of the novel amidic acids are also included in the invention. These can be prepared, for example, by simple reaction of the amidic acid with an appropriate nitrogen base, such as a primary, secondary or tertiary amine, or ammonium hydroxide. The neutralization reaction occurs easily at room temperature or moderately elevated temperature.

The particular N,N'-substituted methylene diamines employed in the amidation reaction described above are prepared conveniently by condensation of a suitable primary amine or mixture of primary and secondary amines with formaldehyde in the proportion of 2 mols of amine to 1 mol of formaldehyde. Where a mixture of primary and secondary amines is employed, at least one-half of the mixture on a molar basis should be primary amines.

As will be evident from the generic formula for the methylene diamine set forth above, the substituents of the primary and secondary amines employed in the condensation reaction may vary widely. Thus, primary or secondary amines having alkyl, alkenyl, cycloalkyl, aryl, alkaryl, and aralkyl substituents are suitable. Illustrative of primary, acyclic, aliphatic amines suitable for condensation with formaldehyde to form N,N'-substituents methylene diamines are alkyl amines having at least 8 carbon atoms, and preferably from 8 to 26 carbon atoms, such as octyl, nonyl, decyl, undecyl, dodecyl, tetradecyl, octadecyl and eicosyl. The corresponding alkenyl amines such as octenyl, nonenyl, undecenyl, tetradecenyl, octadecenyl (oleyl) and eicosenyl amines are also suitable. The primary alkyl or alkenyl amines having more than 26 carbon atoms, such as wax amines, are also suitable. Examples of suitable primary cycloalkyl amines include cyclopentyl, cyclohexyl, cycloheptyl amines and the like. Aniline, alphanaphthylamine and beta naphthylamine are illustrative of suitable aryl amines, just as the toluidines and xylidines are illustrative of suitable alkaryl amines. Satisfactory aralkyl amines are exemplified by benzylamine, betaphenylethylamine and the like.

Secondary amines corresponding to all these classes of amines also produce advantageous compounds and include not only amines containing substituents from the same class such as diphenylamine, phenyl alphanaphthylamine and dicyclohexylamine, but also amines containing substituents from different classes such as octyl-phenyl amine and the like. Other suitable secondary amines are N,N-oleyl propanol amine and N,N-dodecyl ethanol amine.

In the class of primary alkyl amines the use of commercial mixtures of fatty amines is preferred. One commercially available mixture of amines is the so-called "cocoamine" which is prepared by converting the mixed acids of coconut oil to the corresponding amines by well known methods. The commercial cocoamine has an average molecular weight of 200–210 and contains predominantly lauryl amine together with lesser proportions of various homologues thereof. By "coco radical" as used herein is meant the mixture of coconut oil fatty acid alkyl groups present as N-substituents in commercial cocoamine.

The condensation of the amines described above with formaldehyde to form N,N'-substituted methylene diamines may be carried out between the reactants alone or in the presence of a solvent. The reaction takes place satisfactorily at temperatures of about 160° F. or lower. When the condensation is complete the temperature may be raised to from about 260° F. to about 400° F. to dehydrate the product. Temperatures materially in excess of 400° F. are undesirable, since they may result in the formation of color-forming bodies and in some decomposition of products.

Thus, the novel additives of this invention are preferably prepared by condensation of the desired primary amines or mixtures of primary or secondary amines with formaldehyde in the proportion of 2 mols of amine to 1 mol of formaldehyde at a temperature of about 160° F., followed by dehydration of the product at a temperature of between about 260° F. and 400° F. To the dehydrated product is added a dicarboxylic acid anhydride in an amount sufficient to provide equimolar proportions of acid anhydride and the methylenediamine. Heat of a degree sufficient to effect the amidation is employed. Normally, a temperature of about 200° F. is satisfactory. The salts of the amidic acid may be prepared by subsequent, or in many instances, simultaneous neutralization of the amidic acid with a suitable basic material.

The resulting product either alone or in the form of a solution concentrate may then be incorporated in the desired mineral oil in a minor proportion, sufficient to confer corrosion inhibiting properties and other desirable properties upon the latter. Normally from about 0.01 per cent to about 1.0 per cent of the additive by weight of the composition is sufficient for this purpose.

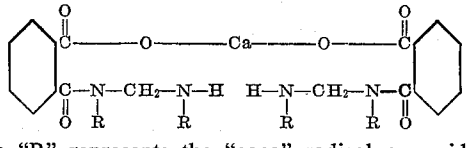
The following illustrative examples will serve to illustrate more clearly the preparation of the novel amidic acids and salts thereof included in this invention, as well as the desirable results obtained by their use in various mineral oils.

*Example I*

Four mols of cocoamine were introduced into a reaction vessel. Two mols of formaldehyde (in a 37 per cent by weight aqueous solution) were slowly added with constant stirring, while maintaining the temperature below about 160° F. When the reaction was complete, after about 60 minutes, the temperature was raised to 350° F. to remove all water, both that added with the formaldehyde and that formed in the reaction. The methylene diamine product so formed and one mol of calcium hydroxide were then dispersed in an equal weight of lubricating oil. Two mols of phthalic anhydride, the acid anhydride of O-phthalic acid, were then added and the temperature held at 200° F. for two hours. The temperature was subsequently raised to 270° F. to dry the product and the product was filtered. The mineral oil solution of the product formed by this process had the following properties:

| | |
|---|---|
| Sp. gr., 60°/60° F | 0.8969 |
| Viscosity, SUV, 100° F | 279 |
| Color, NPA | 1.75 |
| Neutralization No | 1.74 |
| Ash, per cent | 1.6 |
| pH value | 9.9 |

The salt formed in this example had the following formula:



where "R" represents the "coco" radical or residue of the cocoamine.

The salt formed as described above except using a volatile solvent instead of a lubricating oil solvent, exhibited the following characteristics after removal of solvent.

| | |
|---|---|
| Characteristics | Clear solid. |
| Molecular weight | 1200. |
| Ash, per cent by weight | 4.66. |

*Example II*

The salt described in Example I was also formed by metathesis. According to this method, 4 mols of cocoamine were introduced into a reaction vessel, and 2 mols of formaldehyde in a 37 per cent by weight aqueous solution were slowly added with constant stirring, while maintaining the temperature below 160° F. When the reaction was completed, after about 60 minutes, the temperature was raised to 350° F. to remove all water, both that added with the formaldehyde and that formed with

the reaction. The methylene diamine product so formed was dispersed in an equal weight of lubricating oil and 2 mols of a 40 per cent aqueous solution of sodium hydroxide were added. Two mols of phthalic anhydride were added and the temperature held at 200° F. for two hours. Then 1 mol of an aqueous solution of calcium chloride was added continuing agitation for two hours. The temperature was subsequently raised to 270° F. to dry, and the product was filtered to remove the salts and extraneous material. The mineral oil solution of the product formed by this process had the following properties:

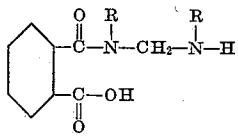
| | |
|---|---|
| Sp. gr., 60°/60° F | 0.8969 |
| Viscosity, SUV, 100° F | 279 |
| Color, NPA | 1.75 |
| Neutralization No | 1.74 |
| Ash, per cent | 1.6 |
| pH value | 9.9 |

*Example III*

In an open enamel lined reaction vessel, 1260 parts by weight of cocoamine and 255 parts by weight of a 37 per cent by weight aqueous formaldehyde solution were reacted for about 60 minutes, while maintaining a temperature below about 160° F. The temperature was then raised to 300° F. in order to remove the water which was formed and which was added with the formaldehyde. The mixture was subsequently cooled to 180° F. and 444 parts by weight of phthalic anhydride were added. The reaction was allowed to proceed for half an hour at 200° F. The product obtained had the following properties:

| | |
|---|---|
| Characteristics | Clear, low-melting solid. |
| Molecular weight | 580. |
| Neutralization No | 96.8. |
| Gravity, °API | 15.7. |
| Viscosity, SUV, 210° F | 107.4. |
| Color, NPA | 3.0. |

The amidic acid formed in this example had the following formula:



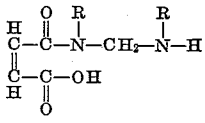
where "R" represents the "coco" radical or residue of the cocoamine.

*Example IV*

In an enamel lined reaction vessel, 1260 parts by weight of cocoamine and 255 parts by weight of a 37 per cent by weight aqueous formaldehyde solution were reacted for about 60 minutes, while maintaining a temperature below about 160° F. The temperature was then raised to 300° F. in order to remove the water of reaction and that in which the formaldehyde had been dissolved. The mixture was subsequently cooled to 180° F. and 294 parts by weight of maleic anhydride were added. The temperature was held at 160–200° F. until completion of the reaction, i. e., about 90 minutes. The product had the following properties:

| | |
|---|---|
| Characteristics | Dark-colored liquid. |
| Molecular weight | 530. |
| Neutralization No | 105.8. |
| Gravity, °API | 20.9. |
| Viscosity, SUV, 210° F | 80.2. |
| Color, NPA | 3.0. |

The amidic acid formed in this example had the formula:



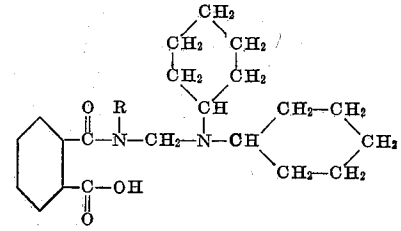
where "R" represents the "coco" radical or residue of the cocoamine.

*Example V*

Into an enamel lined reaction vessel, 4 mols of dicyclohexylamine and 4 mols of a 37 per cent aqueous solution of formaldehyde were introduced. The mixture was reacted for 15 minutes at a temperature of 160° F. and then 4 mols of cocoamine were added. This reaction was allowed to proceed for one hour at a temperature of 184° F. Subsequently, in order to remove water, the temperature was raised to 300° F. The mixture was then cooled to 180° F. and 4 mols of phthalic anhydride were added. The mixture was then heated to 250° F., until the product became clear. The product had the following properties:

| | |
|---|---|
| Characteristics | Clear colored, low-melting solid of fat-like consistency. |
| Molecular weight | 551. |
| Neutralization No | 101.7. |
| Gravity, °API | 15.8. |
| Color, NPA | 7.5. |

The amidic acid formed in this example had the formula:



where "R" represents the "coco" radical or residue of the cocoamine.

As will be obvious to one skilled in the art, any of the primary amines or mixtures of primary and secondary amines described also can be utilized to form the methylene diamines according to the procedure described in Examples I–V, inclusive. Also, any of the previously described class of acid anhydrides can be substituted in the above examples with satisfactory results.

The amidic acids and salts of this invention are useful in many arts, particularly those where corrosion and rust inhibiting properties are desired. Their solubility in oil permits their use in lubricating oils where it is desirable to inhibit rust and corrosion. Moreover, these compounds produce excellent results when used in lubricating oils which encounter severe operating conditions. The effectiveness of our new compounds as mineral oil additives is clearly illustrated by the following examples.

*Example VI*

A turbine lubricating oil was treated with 0.3 per cent by weight of the product prepared according to Example I above. Comparison tests of the untreated oil and the treated oil were as follows:

| | Untreated Oil | Treated Oil |
|---|---|---|
| Gravity, ° API | 29.0 | 28.9. |
| Viscosity, SUV: | | |
| 100° F | 407 | 407. |
| 130° F | 192.7 | 190.6. |
| 210° F | 60.0 | 59.6. |
| Viscosity Index | 105 | 103. |
| Flash, OC, ° F | 465 | 460. |
| Fire, OC, ° F | 540 | 535. |
| Pour, ° F | +5 | +5. |
| Appearance | bright | bright. |
| Color, NPA | 2.75 | 2.75. |
| Carbon Residue, percent | 0.14 | 0.13. |
| Precipitation No | nil | nil. |
| Sulfur, B, percent | 0.14 | 0.12. |
| Copper Strip Test, 212° F., 3 Hr | passes | passes. |
| Corrosion Test, ASTM D 665-47 T, Distilled Water: | | |
| Steel Rod, Appearance | rusted | bright. |
| Area Rusted, percent | 100 | 0. |
| Synthetic Sea Water— | | |
| Steel Rod, Appearance | rusted | bright. |
| Area Rusted, percent | 100 | 0. |
| Neutralization No | 0.04 | 0.04. |
| Ash, percent | trace | 0.002. |

*Example VII*

An improved cup grease was prepared by treating a conventional cup grease with 0.3 per cent by weight of the product prepared according to Example I above. The properties of the untreated cup grease and the cup

grease improved with the additive of this invention are illustrated below:

| | Untreated Grease | Treated Grease |
|---|---|---|
| Sp. Gr., 60°/60° F | 0.940 | 0.940. |
| Melting Point, ° F., Hawxhurst | 197 | 195. |
| Dropping Point, ° F., ASTM D 566-42 | 220 | 215. |
| Flow Point, ° F., Navy Dept. Specification 14-G-ld. | 210 | 212. |
| Consistency, Mm., Braun, 77° F., 2.50 G | 34 | 34. |
| Penetration, ASTM D 217-44 T, 77° F., 150 G., 5 Sec.: | | |
| Unworked | 319 | 321. |
| Worked | 328 | 335. |
| Water by Distillation: Percent Wt | 1.0 | 1.0. |
| Corrosion Test, Method 423, Gulf, 5 cc. Syn. Sea Water, 140° F., 12 Days, Steel Strip, Appearance. | rusted | bright. |

*Example VIII*

An improved diesel fuel was prepared by treating a diesel fuel (light) with the additive prepared in accordance with Example I above in the ratio of 100 pounds of the additive per 1000 barrels of fuel. The properties of the untreated and treated diesel fuel appear below:

| | Untreated Diesel Fuel (Light) | Treated Diesel Fuel (Light) |
|---|---|---|
| Gravity, ° API | 42.6 | 42.5. |
| Viscosity, SUV, 100° F | 31.4 | 31.6. |
| Flash, P-M, ° F | 146 | 146. |
| Cloud, ° F | −40 | −40. |
| Pour, ° F | −45 | −45. |
| Color, Saybolt | +19 | +19. |
| Doctor | good | good. |
| Odor | normal | normal. |
| Sulfur, L, Percent | 0.05 | 0.05. |
| Water & Sediment, Percent | nil | nil. |
| Copper Strip Test, 122° F., 3 Hr | passes | passes. |
| Corrosion Test, Method 412, Gulf 4 cc. Water, 36 cc./Oil, 12 Days: | | |
| Steel Strip, Appearance | rusted | bright. |
| Area Rusted, Percent | 100 | 0. |

*Example IX*

An improved turbine lubricating oil was prepared by treating a turbine lubricating oil base with 0.1 per cent by weight of the addition agent prepared according to Example IV above. The properties of the unimproved turbine oil and the improved turbine oil were as follows:

| | Unimproved Oil | Improved Oil |
|---|---|---|
| Gravity, ° API | 31.7 | 31.7. |
| Viscosity, SUV: | | |
| 100° F | 150.5 | 150.4. |
| 210° F | 43.8 | 43.8. |
| Viscosity Index | 110 | 110. |
| Color, NPA | 1.25 | 1.25. |
| Corrosion Test, ASTM D 665-47 T, Distilled Water: | | |
| Steel Rod, Appearance | rusted | bright. |
| Area Rusted, Percent | 100 | 0. |
| Neutralization No | 0.02 | 0.03. |

*Example X*

An improved turbine lubricating oil was prepared by treating a turbine lubricating oil base with 0.1 per cent by weight of the addition agent prepared according to Example V above. The unimproved and the improved turbine oils had the following properties:

| | Unimproved Oil | Improved Oil |
|---|---|---|
| Gravity, ° API | 31.7 | 31.3. |
| Viscosity, SUV: | | |
| 100° F | 150.5 | 152.8. |
| 210° F | 43.8 | 43.8. |
| Viscosity Index | 110 | 110. |
| Color, NPA | 1.25 | 1.5. |
| Corrosion Test, ASTM D 665-47 T, Distilled Water: | | |
| Steel Rod, Appearance | rusted | bright. |
| Area Rusted, Percent | 100 | 0. |
| Neutralization No | 0.02 | 0.04. |

*Example XI*

An improved turbine lubrication oil was prepared by treating a turbine lubricating oil base with 0.1 per cent by weight of the addition agent prepared according to Example III above. The properties of the unimproved turbine and the improved turbine oil were as follows:

| | Unimproved Oil | Improved Oil |
|---|---|---|
| Gravity: ° API | 31.7 | 31.7. |
| Viscosity, SUV: | | |
| 100° F | 150.5 | 150.5. |
| 210° F | 43.8 | 43.8. |
| Viscosity Index | 110 | 110. |
| Color, NPA | 1.25 | 1.25. |
| Corrosion Test, ASTM D 665-47 T, Distilled Water: | | |
| Steel Rod, Appearance | rusted | bright. |
| Area Rusted, Percent | 100 | 0. |
| Neutralization No | 0.02 | 0.04. |

A description of the procedure to be followed in Gulf Corrosion Test, Method 412, mentioned in Example VIII above, is found in U. S. Patent No. 2,378,442, to Smith et al., at page 4, column 1, lines 35 to 53, inclusive. A description of Gulf Corrosion Test, Method 423, mentioned in Example VII above, is presented in our above-identified copending application Serial No. 312,843.

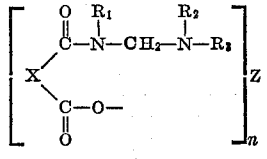
From the foregoing it is evident that the described amidic acids and salts thereof can be used in a large number of compositions to improve the rust and corrosion inhibiting properties thereof. Thus, in addition to mineral lubricating oils, greases and diesel fuels, the described additives can be employed in conjunction with gasoline, furnace oil, slushing oil and other oils. As has been indicated, the described amidic acids and salts thereof can also be incorporated in mineral oil products such as light naphtha, which are not employed as either a fuel or a lubricant. In such instances our compositions find use in the coating art, whereby a metallic article subject to corrosion is brushed, dipped or sprayed with the composition comprising the solvent vehicle and the additive. Subsequent evaporation of the solvent leaves an adherent corrosion resistant coating of the additive on the metallic article.

It is to be understood that the improved mineral oil compositions of this invention can be additionally improved by incorporation therein of other known additives in order to confer other desirable properties such as increased resistance to oxidation, increased stability, etc. thereon. Thus, there can be added viscosity index improvers, thickeners, bearing corrosion inhibitors, antioxidants, dyes, etc.

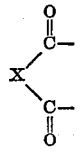
Resort may be had to such modifications and variations as fall within the spirit of the invention and the scope of the claims appended hereto.

What we claim is:

1. A mineral oil composition comprising a major amount of a mineral oil and a minor, corrosion inhibiting amount of an agent having the formula:



where



represents the acyl residue of a dicarboxylic acid capable of forming a cyclic acid anhydride, $R_1$ and $R_2$ represent radicals selected from the group consisting of acyclic aliphatic radicals having at least eight carbon atoms, cycloalkyl, aryl, alkaryl, and aralkyl radicals, $R_3$ is selected from the group consisting of hydrogen and a radical of the same kind as $R_1$ and $R_2$, Z is selected from the group consisting of hydrogen and a salt-forming radical, and *n* is an integer equal to the valence of Z.

2. The composition of claim 1, where the agent is present in the amount of from about 0.01 per cent to about 1.0 per cent by weight of the composition.

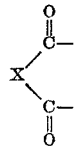
3. The composition of claim 1, where the mineral oil is a fuel oil.

4. The composition of claim 1, where the mineral oil is a diesel fuel.

5. The composition of claim 1, where the mineral oil is a lubricating oil.

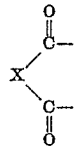
6. The composition of claim 1, where the mineral oil is a lubricating grease.

7. The composition of claim 1 where



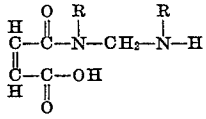
is the acyl residue of phthalic acid.

8. The composition of claim 1 where



is the acyl residue of maleic acid.

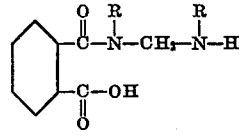
9. A mineral oil composition comprising a major amount of a mineral oil and a minor, corrosion inhibiting amount of an amidic acid having the formula:



where R is lauryl.

10. The composition of claim 9, where the amidic acid is present in the amount of from about 0.01 per cent to about 1.0 per cent by weight of the composition.

11. A mineral oil composition containing a major amount of a mineral oil and a minor, corrosion inhibiting amount of an amidic acid having the formula:

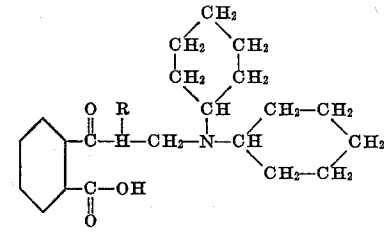


where R is lauryl.



12. The composition of claim 11, where the amidic acid is present in the amount of from about 0.01 per cent to about 1.0 per cent by weight of the composition.

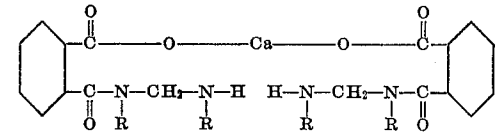
13. A mineral oil composition comprising a major amount of mineral oil and a minor, corrosion inhibiting amount of an amidic acid having the formula:



where R is lauryl.

14. The composition of claim 13 where the amidic acid is present in the amount of from about 0.01 per cent to about 1.0 per cent by weight of the composition.

15. A mineral oil composition comprising a major amount of a mineral oil and a minor, corrosion inhibiting amount of a salt of an amidic acid having the formula:



where R is lauryl.

16. The composition of claim 15 where the salt is present in the amount of from about 0.01 per cent to about 1.0 per cent by weight of the composition.


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