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MINERAL OIL COMPOSITION

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This invention relates to lubricating oil compositions. More particularly, the invention is concerned with mineral lubricating oil compositions of a character adapted to protect ferrous and other metal surfaces to which they are applied, from rusting and other types of corrosion in addition to affording lubrication of such surfaces.

Simple mineral oil films afford only a limited protection to metal surfaces from rust and other types of corrosion, but do not afford any great protection under severe conditions of use. Many so-called anti-rust lubricating oils have been proposed, consisting of mineral oils and added constituents intended to protect metallic surfaces from rust, tarnish or corrosion. Most of them are of rather limited applicability, in that while they afford satisfactory protection to one class of metals, they may be ineffective, or even deleterious, with another class of metals.

These shortcomings of such mineral oils and oil compositions are serious in many cases, particularly in cases wherein a plurality of metals must be simultaneously lubricated while exposed to corrosive conditions; for example, in the case of copper-alloy bearings with steel shafting and the case of electric motors where surfaces of both steel and copper are exposed to corrosive conditions. Moreover, many such oils show undue sensitivity to moisture and air and other substances to which they are exposed and lubricating films of such oils do not effectively protect the metal against rusting or tarnishing when exposed to moisture and air or other corrosive atmospheres. It is also found that some compounded oils which are effective as regards preventing rust, are deficient in lubricating properties.

Among the objects of the present invention is the provision of an anti-corrosion lubricating oil composition, of good lubricating properties, adapted to protect steel from rusting while being of itself free from tendency to corrode copper and other metallic surfaces, and being in itself relatively inert and unaffected by air and moisture.

These and other objects of the invention are achieved by the provision of a mineral oil composition, including as a rust inhibitor, the substantially neutral reaction products obtained by reacting primary fatty amines containing from 8 to 18 carbon atoms with acid phosphate esters of alkylated phenols containing at least one branched chain alkyl group, the said amines and acid phosphate esters being reacted in approximately equimolecular proportions under such conditions that the reaction product or mixture has a pH value between 5.5 and 7.5.

We have found that such improved oil compositions are very effective as anti-corrosion lubricants for metal surfaces in general. They form tightly adherent oil films on the metal, protecting the metal surfaces from moisture and air. In addition, the improved oil composition itself is free from any tendency to attack copper, steel and other metals by reaction therewith or otherwise. For instance, polished or highly finished steel surfaces protected by establishing and maintaining the improved oil composition on the surfaces thereof remain bright indefinitely and copper alloy bearings (which present a difficult problem in protection from corrosion) are maintained in their highly finished condition even under unfavorable conditions of use. Further, copper, aluminum, zinc, silver, tin and their alloys are all effectively guarded against corrosion and are well lubricated by these improved oil compositions containing our new rust inhibitors.

In general, various improved lubricants, such as household lubricants, machine oils, gun oils, turbine oils, slushing oils and the like are prepared, by selecting a suitable lubricating oil or base and dissolving the required amount of the above described reaction products in the oil.

In particular, the invention finds special utility in preparing improved oil compositions of the so-called household type, useful for lubricating light mechanisms such as electric motors, guns, etc., and containing relatively light (low viscosity) oils as the lubricating base. That is, the invention is especially well suited for improving highly refined lubricating oils having a Saybolt Universal viscosity ranging from 60 to 150 at 100° F.; mineral oils of 100 viscosity being especially suitable for preparing our improved oil compositions.

In general, from 0.01 to 10.0 per cent of the inhibitor is sufficient to impart to lubricating oils adequate rust-inhibiting properties. More concentrated oily solutions or oil mixtures of the inhibitor can be prepared, as a stock solution or concentrate, which can be diluted with lubricating oil to form a rust-preventive lubricant. Usually 0.5 per cent or less of the inhibitor is sufficient to impart to mineral lubricating oils adequate rust-inhibiting properties for metal articles exposed to moisture and air, but as much as 25 per cent by weight on the oil is sometimes incorporated to afford prolonged and complete protection from rust under extremely severe conditions. Such highly concentrated compositions,

still retain excellent lubricating and other characteristics in addition to affording practically complete rust protection under extraordinary conditions.

The reaction products we employ are relatively stable compositions under ordinary conditions. At room temperatures, some of them are heavy viscous oily liquids, while others are soft solids which melt to oily liquids at slightly elevated temperatures. All of them are relatively non-volatile. They are insoluble in water and more or less water repellent. They are very resistant to hydrolysis. These reaction products or inhibitors are soluble in oils, both mineral and fatty oils. Their solubility varies somewhat with the particular oil. For instance, light paraffinic oils, such as employed in making household lubricants, etc., dissolve approximately 50.0 per cent by weight of these reaction products, forming stable solutions thereof. Naphthenic type mineral oils dissolve somewhat larger amounts. In general, the solubility of these reaction products or inhibitors is quite high in most oils.

These advantageous rust inhibitors can be readily prepared from primary fatty amines containing from 8 to 18 carbon atoms and acid phosphate esters of alkylated phenols containing at least one branched chain alkyl group, by reacting said amines and acid phosphate esters together in approximately equimolecular ratios, as stated ante. In preparing our rust inhibitors or reaction products, the reaction is controlled so as to produce substantially neutral reaction products or mixtures having a pH value within the range 5.5 to 7.5 (as measured with quinhydrone-calomel electrode assembly).

The primary fatty amines employed as one reactant are mono-alkyl amines having the following formula:



wherein R represents an alkyl group containing from 8 to 18 carbon atoms. For the present purposes, the primary fatty amines containing an even number of carbon atoms in the alkyl group thereof are particularly advantageous. They yield excellent rust inhibitors when reacted with the said acid phosphate esters. Further, they are readily available as commercial materials. This advantageous class of primary fatty amines may be represented by the following formula:

$$H_2N—CH_2—(CH_2)_n—CH_3$$

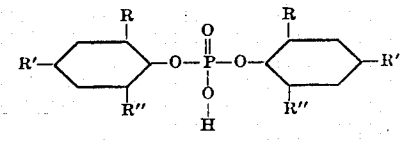
where n is an even number between 6 and 16. This generic class includes the following members:

Mono-capryl amine, $CH_3(CH_2)_6CH_2NH_2$
Mono-lauryl amine, $CH_3(CH_2)_{10}CH_2NH_2$
Mono-myristyl amine, $CH_3(CH_2)_{12}CH_2NH_2$
Mono-palmityl amine. $CH_3(CH_2)_{14}CH_2NH_2$
Mono-stearyl amine, $CH_3(CH_2)_{16}CH_2NH_2$

Any of the above amines yield advantageous rust inhibitors when reacted with the said acid phosphate esters as described ante.

That is, we sometimes prepare the rust inhibitors by reacting the acid phosphate ester with some particular one of these amines, but more usually mixtures of fatty amines of this group are employed as they afford a somewhat better product than if only one amine is used. One commercially available mixture, which we ordinarily employ, is the so-called "coco amine" made in known ways by conversion of cocoanut oil fatty acids into corresponding amines. Coco-amine contains a major amount of mono-lauryl amine (the C_{12} amine) with minor amounts of its adjacent homologues. The average molecular weight of cocoamine ranges between 200 and 210. A value within this range is considered as the molar weight in reacting cocoamine with the acid phosphate ester.

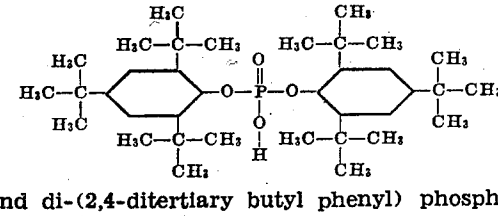
The other reactant, the acid phosphate esters, are di-esters of ortho-phosphoric acid and may be represented by the following generic formula:



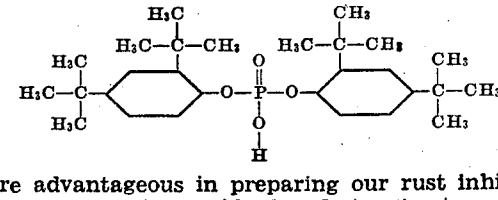
wherein R, R' and R'' represent hydrogen or an alkyl group, at least one branched chain alkyl group being present. The acid phosphate di-esters of tri-alkylated phenols containing a plurality of branched chain alkyl groups, such as tertiary and secondary butyl groups, are especially advantageous in the practice of this invention, particularly those in which R is a tertiary butyl group and R' and R'' are alkyl groups selected from the class consisting of methyl, secondary butyl and tertiary butyl groups, as more fully shown post.

These acid phosphate esters can be prepared by various methods from alkylated phenols containing one or more branched chain alkyl groups attached to the phenyl nucleus in the positions indicated ante.

In particular, the acid phosphate di-esters of 4-tertiary-butyl phenol, 2-tertiary-butyl-4-secondary butyl phenol, 2,4-ditertiary-butyl phenol, 2,6-ditertiary-butyl - 4 - secondary-butyl phenol, 2,4,6 - tritertiary - butyl phenol, 2,6 - ditertiary-butyl-4-methyl phenol and 4,6-ditertiary-butyl-2-methyl phenol are advantageous for the present purposes. For instance, as shown in the illustrative examples post, di-(2,4,6-tritertiary-butyl phenyl) phosphate having the formula



and di-(2,4-ditertiary butyl phenyl) phosphate having the formula



are advantageous in preparing our rust inhibitors. These two acid phosphate di-esters are viscous oily liquids at room temperature and are readily soluble in mineral oils. Accordingly, mineral oil solutions of these acid phosphate esters may be employed in preparing concentrates of our rust inhibitors in oil; the amine being added to such oil solutions and reacted with the acid phosphate esters dissolved therein to form the rust inhibitor in situ in the oil. In general, acid phosphate di-esters of alkylated phenol containing tertiary or secondary alkyl groups are useful and advantageous in preparing our rust inhibi-

tors; those containing a plurality of such tertiary or secondary alkyl groups being particularly advantageous for the present purposes. Such acid phosphate di-esters are readily soluble in mineral oils and have other properties rendering them advantageous for the purposes of this invention.

As a class, these acid phosphate di-esters of alkylated phenols containing branched chain alkyl groups react readily with primary fatty amines. In general, the reaction is exothermic and is quite vigorous in most cases. In preparing our rust inhibitors, the reaction temperature is controlled by suitable means to secure smooth reaction and obtain addition products of the amine and acid phosphate esters. In doing so, the temperature of the reaction mixture is controlled by cooling or heating as required; the temperature of the reaction mixture being maintained below 180° F., to avoid splitting out water from the mixture. The reaction temperature is usually maintained between 140° and 170° F. during the larger portion of the reaction and within this range excellent rust inhibitors are obtained; the pH value of the reaction products being adjusted in the final stages of the reaction to within the desired range stated ante.

The following examples illustrate advantageous methods of preparing these rust inhibitors:

Example 1.—To a suitable kettle equipped with heating and cooling coils and means for mechanical agitation there were added 210 pounds of dodecyl amine, and then 586 pounds of di-(2,4,6-tritertiary-butyl-phenyl) phosphate were slowly added, the said acid phosphate being gradually added at such rate as to keep the temperature of the reaction mixture below 180° F., whereby to avoid splitting out water from the mixture. After the addition of the acid phosphate, the mixture had a pH of 3.0 and it was brought to the desired pH of 7.2 by adding 18 pounds of dodecyl amine and stirring the final mixture for one hour.

The substantially neutral reaction product so obtained was a heavy viscous oily liquid when cooled to room temperature. This reaction product or rust inhibitor was light amber red in color and had a pleasant odor. It was sufficiently soluble in mineral oils for the present purposes.

Similar viscous, oily rust inhibitors can be readily obtained having other pH values within the range of 5.5 to 7.5, by controlled adjustment of the pH during the last stages of the reaction. Likewise our oily rust inhibitors can be prepared from other primary fatty amines and other acid phosphate di-esters of alkylated phenols, as well as from the particular amine and acid phosphate ester employed in Example 1. The preparation of another such advantageous rust inhibitor is illustrated in the following example.

Example 2.—Here again, the reaction is carried out in a suitable kettle equipped with means for heating and cooling and for agitating the mixture.

Into such a kettle there were introduced 210 pounds of dodecyl amine and then 474 pounds of di-(2,4-ditertiary-butyl-phenyl) phosphate were gradually added with stirring. The reaction was vigorous and quite exothermic and the acid phosphate was added at such a gradual rate as to facilitate maintaining the reaction temperature below 180° F., the mixture being cooled if desired to maintain it below that temperature. In this way, the reaction temperature was maintained between 140 and 170° F. during the larger portion of the reaction. After all the acid phosphate had been added, the mixture was warmed to facilitate completion of the reaction. At this stage, the reaction mixture had a pH between 3 and 4 and the final adjustment and control of the pH value was then effected. In doing so, 22 pounds of the amine were added and the mixture further heated with stirring until the reaction product had a pH of approximately 7.2.

The rust inhibitor so obtained was a heavy viscous oily liquid when cooled to room temperature, and was sufficiently soluble in mineral oils for making our improved oil compositions.

In other words, the substantially neutral reaction products obtained in Examples 1 and 2, respectively, like the amines and acid phosphate esters from which they were prepared, are soluble in mineral oils. Accordingly, we sometimes prepare concentrated solutions of these rust inhibitors in mineral oil by forming them in situ in the oil. In such processes, a fatty amine is first dissolved in the mineral oil and then the acid phosphate ester added, the mixture being stirred and maintained at the desired temperature until the reaction is completed and the mixture has a pH value within the specified range. In preparing such oil concentrates of our rust inhibitors sometimes additional amine is added in the later stages to adjust the pH value as desired. The concentrates or oil solutions of neutral reaction products so obtained are useful addition agents to various types of lubricants. The preparation of such concentrates is illustrated in the following example.

Example 3.—817 pounds of light mineral lubricating oil having a viscosity of 100 seconds SUV at 100° F. were added to an iron vessel equipped with means for heating and cooling and agitation. The initial temperature of the oil was 80° F. To this oil were added 210 pounds of dodecyl amine which was thoroughly mixed with the oil by mechanical agitation and the final temperature of this mixture was 82° F. To the oil-amine mixture 586 pounds of di-(2,4,6-tritertiary-butyl-phenyl) phosphate were added over a period of two hours, during which time the mixture was agitated and the temperature of the reaction mixture rose to 178° F. After stirring for one hour the pH of the mixture was 3.8. In order to increase this pH value to the desired range, 14 pounds of dodecyl amine were added to the mixture and stirred; the resultant mixture had a pH of 5.9. To secure a final adjustment, 7 additional pounds of dodecyl amine were added to the mixture which, after stirring for one hour and cooling to room temperature, had a pH of 7.2.

The oily mixture prepared in this Example 3 can be regarded as a sort of concentrated stock solution which can be stored indefinitely and incorporated in lubricating oil as desired to prepare commercial anti-rust oils, etc.

In general, the rust inhibitors or reaction products prepared as described ante, may be dissolved in various types of mineral oils and improved anti-rust and non-corrosive oil compositions obtained which are capable of inhibiting or retarding the rusting or corrosion of various metals as described. The preparation of such improved mineral oil compositions is illustrated in the following examples.

Example 4.—A household-type lubricant was prepared by dissolving 0.1 per cent by weight of the rust inhibitor obtained in Example 1 in a refined oil.

Example 5.—Another household-type lubricant was prepared by dissolving 0.1 per cent by weight

of the rust inhibitor obtained in Example 2 in a refined oil.

The properties of the improved oil compositions of Examples 4 and 5 ante, as compared with the properties of the base oil employed, are as follows:

Properties	Base oil	Improved lubricant	
		Ex. 4	Ex. 5
Gravity, °API	29.2	28.7	28.8
Viscosity, SUV, 100° F	102	102	103
Flash, OC, ° F	330	320	330
Fire, OC, ° F	365	360	365
Pour, ° F	−30	−30	−30
Color, Saybolt	+7	+5	+5
Carbon residue	Trace	0.01	0.01
Neutralization No	Nil	Nil	Nil

These improved oils had excellent lubricating properties. They also effectively protected steel and other metals against rusting and corrosion.

In fact, the improved oil compositions of Examples 4 and 5, when tested for non-rusting properties by the various accelerated corrosion tests described post, gave excellent results as compared with the base oil. For instance, in special corrosion test No. 1, the base oil began to show rust on a steel strip after six hours in the test, whereas after twelve days the improved oil showed no evidence of rust. In the other and more drastic corrosion tests described post, these improved oils showed even greater superiority over the base oil as regards protecting steel and other metals against tarnish and corrosion. The results of these special corrosion tests are summarized in the following table.

Special corrosion test	Base oil	Improved lubricant	
		Ex. 4	Ex. 5
NO. 1			
Steel strip	Fails	Passes	Passes.
Copper strip	do	do	Do.
NO. 2			
Steel strip	Fails	Passes	Passes.
Copper strip	do	do	Do.
NO. 3			
Steel strip	Fails	Passes	Passes.
Copper strip	do	do	Do.

The special corrosion tests referred to in the above table were as follows:

Test No. 1.—36 cc. of the oil or oil composition to be tested and 4 cc. of distilled water are put in a 1" by 6" Pyrex test tube and a polished strip of copper or steel is immersed in the liquids. To mix the oil and water, 2000 cc. of air per hour are bubbled through the mixture from a point within the bottom of the test tube. The apparatus is set in a water bath maintained at 122° F. (50° C.) and the original water level in the tube is maintained by additions of fresh water over 24 hours. The test is continued for twelve days regardless of whether or not the metal strip showed signs of corrosion. This test may also be carried out with other metal strips such as zinc and tin as well as with copper or steel strips.

In this test, the lower part of the metal strip is completely immersed in the water and the only way the oil can wet the metal surface is for the oil to creep down over it against the water pressure. Accordingly, rusting immediately begins at the level where the oil and the water meet, unless the metal surface is preferentially wetted by the oil; that is, unless the oil film is capable of spreading on the metal surface and displacing water therefrom.

In other words, this test is a rather drastic one for the protective properties of oils and oil compositions as regards the prevention of rust, tarnish and corrosion. For instance, in this test, ordinarily a steel strip shows rust in about 6 hours and a copper strip will tarnish within approximately 12 hours when an uninhibited oil is so tested. On the other hand, generally the addition of as little as 0.1 per cent by weight of our rust inhibitors to the oil will maintain both copper and steel strips free from tarnish and rust for periods up to 12 days, a maximum duration of this test.

Test No. 2.—In this test, 180 cc. of the oil or oil composition to be tested and 20 cc. of distilled water are placed in a 400 cc. beaker, and a polished metal strip is immersed in the oil-water mixture; 2000 cc. of humidified air per hour were passed through the mixture and the apparatus is maintained at 122° F. as in Test 1. The water level is maintained by daily additions of distilled water and at the end of 12 days the water layer is removed by syphon and fresh water is added. The water removed is analyzed to determine whether the inhibitor is being extracted or leached from the oil solution. Fresh strips are added when the water is changed, so as to present a fresh metal surface to the partially leached oil. This cycle is continued for 72 days unless the test specimen becomes too corroded, making further testing impractical. In this test, the test specimens are usually steel, copper, tin, silver and zinc, although other special metals may be used.

Test No. 3.—The apparatus outlined in Test 1 is employed and the testing conditions are identical, except that water containing sodium chloride in the concentration equivalent to that of the total salt content of sea water is added instead of distilled water. This is a much more severe test and is conducted also for 12 days, the water level being maintained in the same manner as for Test 1.

In general, the special corrosion tests described ante are drastic tests of the rust preventive properties of oil compositions. In these tests, the strip of steel or other metal is subjected to attack by moisture and air under extremely severe conditions particularly in Test No. 3. Further, the oil film on the metal and the oil itself are exposed to not only the leaching action of the water but also to oxidation. Accordingly, if rusting is prevented under such drastic conditions in these tests, there is good assurance that the inhibitor will be capable of preventing, or at least retarding rusting even under extremely severe service conditions. Therefore, an inhibitor which, when dissolved in an oil, permits the oil to pass all three of these tests is considered an excellent inhibitor.

As shown ante, improved oil compositions containing our rust inhibitors have successfully passed all of these tests. Further, our improved oil composition in addition to having excellent anti-rust properties are also excellent lubricants. Likewise, as shown ante, the anti-rust properties of the improved oil may be controlled by selecting the rust inhibitor and varying the proportions thereof incorporated in the oil. For instance, in

certain special cases, where the prevailing conditions are so extreme as to require the lubricant to be extremely highly protective toward metal surfaces, a higher percentage of rust inhibitor is incorporated in the oil. The following example is illustrative of such embodiments of this invention.

Example 6.—In preparing one such lubricant, 0.3 per cent by weight of the rust inhibitor obtained in Example 1 was incorporated in a suitable oil base. The oil base selected and the improved lubricant made from it have the following properties:

	Base oil	Improved oil
Gravity, °API	28.5	28.4
Viscosity, SUV, 100° F.	110	109
Color, NPA	1.25	1.25

This improved oil is capable of preventing rusting and corrosion of metals under extreme conditions, even in the presence of salt and salt water. For instance, when tested by the special corrosion Tests Nos. 1 and 3 ante, the improved oil showed no evidence of corroding either copper or steel after 12 days in either of the above tests. On the other hand, the base oil allowed the steel strip to rust in approximately 8 hours in the fresh water (Test No. 1) and in about 3 hours in the salt water test (Test No. 3). Also, with the base oil, the copper strips were coated with a greenish deposit after overnight testing; the copper strips being more slowly attacked than the steel strips but nevertheless substantially tarnished and corroded.

The specific embodiments described above are merely illustrative of the practice of this invention and other embodiments thereof may be used as desired; for instance, these rust inhibitors are compatible with various other compounding ingredients and they may be added to blended oil bases or compounded lubricants to obtain other types of improved lubricants. Improved oil compositions can be prepared from base oils containing varying amounts of fatty oils admixed with mineral oil, such blends being especially useful as household lubricants. By the present invention, any of the previously known household or other lubricants containing relatively light lubricating oils can be improved by adding small amounts of our rust inhibitors as described.

The invention is equally applicable to heavy mineral oils, petrolatum oils, greases, and jellies; in fact to any petroleum lubricant or coating oil, in which corrosion-preventive properties are desired. In the claims the term petroleum lubricant includes mineral oils, jellies and the like even when used for purposes other than strict lubrication, e. g. slushing oils and gun greases.

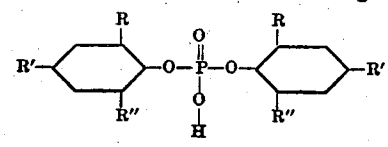
One important application of the present invention is the prevention of rusting in automotive and aviation engines before or after these have been used, either upon aging or intermittent actual service or in storage of engines or planes awaiting completion of assembly, shipment, and other delays after engine break-in. Such rusting is aggravated by the presence in the crankcase and crankcase-oil of moisture, sulfur, oxidation products from petroleum, tetraethyl lead, decomposition products, etc. Attempts have been made to remedy this condition by washing out all motor oil from the crankcase of an engine if it is to be stored for any appreciable time, or adding compounds containing large amounts of oiliness agents and the like. The present invention presents a more economical remedy for these conditions, for corrosion is effectively retarded under such conditions when from 0.5 to 1.0 per cent by weight of our compounds is added to a motor oil. Adding the highly potent rust preventive compound during the latter part of the break-in period for the new engine, with operation for sufficient time after addition to assure full mixing and coating of parts, will prevent rusting.

Extensive tests in which the pH values of the agent of the present invention as employed in finished oils were varied, confirm our discovery that the optimum results for a given amount of the agent in oil are secured when the pH value is maintained within the stated range of 5.5 to 7.5 for the compounding agent. There is usually a slight drop in pH value in the dilute finished oil solution as compared with the values for the compounding agents or mixtures thereof. The finished oil (which usually contains only a small proportion of the dilute compounding agent) should test between 5.0 and 6.0; advantageously around 5.7.

Any substantial departure from the stated range either on the alkaline or acid side gives less desirable results. For example, with an unduly low pH value (acid side) there is some rusting of steel surfaces by our steel strip corrosion test, while compositions with an excessively high pH value (alkaline side) may produce greenish corrosion effects in the corrosion tests with copper surfaces and the like, although not affecting steel to any appreciable extent. The exact adjustment is attained in preparing the rust inhibitor compound by reacting the desired molecular proportions of the two agents in the manner described, and after the neutralization or compounding reaction has progressed pract cally to completion, by testing the reaction product, and making any minor adjustments that are necessary for exact control by adding the required small additional proportion of the amines (if on the acid side, of our desired range) or of the acid phosphate ester (if the alkaline side). In measuring the pH of the anti-rust agents of the present invention and oils containing them, which are both substantially water-insoluble, the sample is dissolved in normal butanol (which contains a small amount of water) adjusted exactly to pH 7.0. The butanol acts as a blending agent for the water and the relatively insoluble material, but does not appreciably alter the pH value as it is of pH exactly 7 itself. Measurement is made by electrometric or colorimetric procedures; the results agree closely.

What we claim is:

1. An improved oil composition, effective as a lubricant for metal surfaces and capable of preventing corrosion thereof in the presence of moisture and air, comprising a petroleum lubricant containing in solution therein a small proportion of substantially neutral addition product of primary fatty amines containing from 8 to 18 carbon atoms and acid phosphate di-esters of trialkylated phenols having the following formula



wherein R represents a tertiary butyl group and R′ and R″ represent an alkyl group selected from the class consisting of methyl, secondary butyl and tertiary butyl groups, said substantially neu-

tral addition products having a pH between 5.5 and 7.5 and the proportion thereof dissolved in the lubricant being sufficient to prevent rusting of ferrous metals.

2. The improved oil composition of claim 1 wherein said addition product is a substantially neutral addition product of said acid phosphate di-ester and a primary fatty amine having the formula

$$H_2N—CH_2—(CH_2)_n—CH_3$$

wherein n is an even number between 6 and 16.

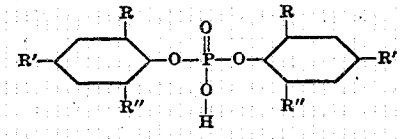
3. The improved oil composition of claim 1 wherein said addition product is a substantially neutral addition product of said acid phosphate di-ester and dodecylamine.

4. The improved oil composition of claim 1 wherein said addition product is a substantially neutral addition product of said primary fatty amines and di-(2,4,6-tri-tertiary-butyl-phenyl) phosphate.

5. The improved oil composition of claim 1 wherein said addition product is a substantially neutral addition product of dodecylamine and di-(2,4,6-tri-tertiary-butyl-phenyl) phosphate, said addition product having a pH value of 7.2.

6. The improved oil composition of claim 1 wherein said petroleum lubricant contains from 0.01 to 10.0 per cent by weight of said substantially neutral addition product dissolved therein.

7. As improved oil compositions, effective as a lubricant for ferrous and other metal surfaces and capable of preventing corrosion thereof in the presence of moisture and air, the improved oil compositions comprising a mineral lubricating oil and 0.01 to 10.0 per cent by weight on the oil of a substantially neutral addition product of primary fatty amines containing from 8 to 18 carbon atoms and acid phosphate di-esters of tri-alkylated phenols having the following formula



wherein R represents a tertiary butyl group and R′ and R″ represent an alkyl group selected from the class consisting of methyl, secondary butyl and tertiary butyl groups, said substantially neutral addition products having a pH between 5.5 and 7.5 and the proportion thereof dissolved in the lubricant being sufficient to prevent rusting of ferrous metals.

8. The improved oil composition of claim 7 wherein said mineral lubricating oil is a light mineral oil having a Saybolt Universal viscosity between 60 and 150 seconds at 100° F.

9. The improved oil composition of claim 7 wherein the addition product is a substantially neutral addition product of dodecylamine and di-(2,4,6-tri-tertiary-butyl-phenyl) phosphate.

10. As improved oil compositions, effective as a lubricant for ferrous and other metal surfaces and capable of preventing corrosion thereof in the presence of moisture and air, the improved oil composition comprising a light mineral oil of viscosity between 60 and 150 seconds SUV at 100° F. containing between 0.01 and 10.0 per cent of a substantially neutral addition product of dodecylamine and di-(2,4,6-tri-tertiary-butyl-phenyl) phosphate, said addition product having a pH value of 7.2 and the proportion thereof being sufficient to prevent rusting of ferrous metals.

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