

[54] CORROSION INHIBITED COMPOSITIONS

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[52] U.S. Cl. **252/77; 252/51.5 A; 252/392**

[51] Int. Cl.² **C10M 1/32**

[58] Field of Search **252/77, 74, 51.5 A, 392**

[56] **References Cited**

UNITED STATES PATENTS

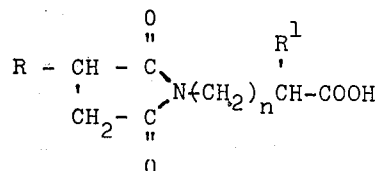
3,251,776	5/1966	Gee.....	252/77
3,796,662	3/1974	Lyle.....	252/74
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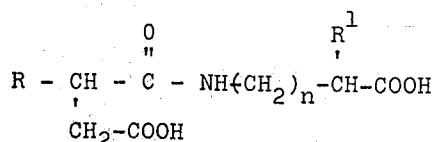
[57] **ABSTRACT**

A corrosion inhibited hydrocarbon oil composition comprising a major amount of a mineral oil of lubri-

cating viscosity and a corrosion inhibiting amount of a succinyl derivative selected from the group consisting of N-(carboxylalkylene) hydrocarbyl succinimide characterized by the formula:



N-(carboxylalkylene) hydrocarbyl succinimide acid characterized by the formula:

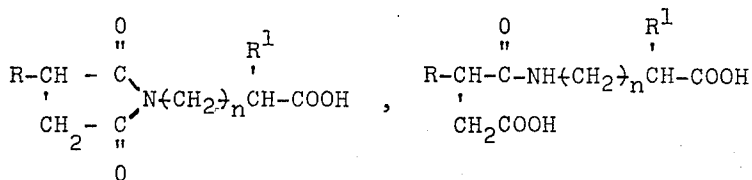


and mixtures thereof where R is alkenyl of from 5 to 20 carbons, R¹ is hydrogen or alkyl of from 1 to 10 carbons and n is an integer of from 0 to 5.

6 Claims, No Drawings

Examples of the hydrocarbon succinic anhydride intermediate contemplated herein are pentenyl succinic anhydride, tetradecenyl succinic anhydride, n-dodecenyl succinic anhydride, 3-butyl octenyl succinic anhydride, t-dodecenyl succinic anhydride and octadecenyl succinic anhydride.

Specific examples of the succinyl inhibitors contemplated herein are those of the formulas:

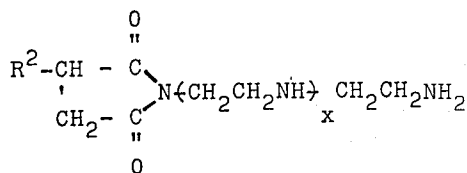


where R equals t-dodecenyl, R¹ is hydrogen and n is 0; R is hexyl, R¹ is hydrogen and n is 2; and R is 4-propyl octadecenyl, R¹ is decenyl and n is 5.

Typical weight ratios of imide to amic in the mixtures of the succinyl corrosion inhibitor are 4:1, 2:1, 1:1, 1:2 and 1:4.

The mineral lubricating oil base which constitutes at least about 85 wt. % of the finished corrosion inhibited composition and at least about 50 wt. % of the concentrate thereof is a refined oil or a mixture of refined oils selected according to the viscosity requirements of the particular service. But normally viscosities between about 120 to 210 SUS at 100°F. are employed. The base oils are derived from naphthenic, paraffinic or a mixture of naphthenic and paraffinic base oils resulting from petroleum refining. In addition to the succinyl corrosion inhibitors contemplated herein, other additive materials are normally incorporated in the base oil. The particular additive or additives found in said base oils will depend upon the service for which the oil is intended. The additional additives contemplated belong in the classes of detergent dispersants, VI improvers, extreme pressure agents, antioxidants, antifoamants, antiwear agents, etc.

When detergent-dispersants are employed, they are usually normally utilized in amounts between about 0.5 and 5 wt. %. Examples of the ashless dispersant are the alkenyl succinimides characterized by the general formula:



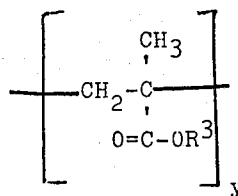
where R² is a monoolefinic aliphatic hydrocarbon radical of from about 50 to 200 carbons and x is an integer of from 1 to 10 derived from a polyethylene polyamine. Particularly suitable derivatives are the diethylene triamine, triethylene tetramine, tetraethylene pentamine of polyisobutylene succinic anhydride, particularly where R² is of a molecular weight between about 700 and 2000, e.g., about 1300. These ashless dispersants are further described in U.S. Pat. Nos. 3,172,892 and 3,202,678. The non ashless dispersants that may be utilized are the alkaline earth metal overbased calcium alkaryl sulfonates such as the carbon dioxide over-based

calcium alkaryl alkaryl sulfonate wherein the alkaryl sulfonate moiety is of a molecular weight of 500 to 1000. These overbased sulfonates are further described in U.S. Pat. Nos. 3,027,325, 3,312,618 and 3,537,996.

Examples of the extreme pressure agents contemplated herein are dithiolthione derived from sulfurizing triisobutylene and alkyl sulfides, disulfides and polysulfides prepared by sulfurization of isobutylene with sul-

fur chloride.

Examples of contemplated viscosity index improvers are the methacrylate ester polymers characterized by the general formula:



where R³ is an alkyl group, a dimethylamino group or a mixture of such groups containing from 1 to 20 carbons and y is an integer providing a molecular weight of the polymer in the range of 25,000 to 1,250,000, preferably 35,000 to 200,000. Methacrylate ester polymers possessing pour depressant and viscosity index improving properties are well known, e.g., U.S. Pat. No. 2,737,496. A very effective material of this type is a tetrapolymer in which R³ represents about 32 wt. % lauryl, about 28 wt. % butyl, 26 wt. % stearyl and 14 wt. % hexyl. The methacrylate ester copolymer is employed in the base oil in an amount ranging from about 0.5 to 10 wt. % preferably 1-5 wt. % in order to impart the desired viscosity index and pour point.

Examples of effective antioxidants are the aryl substituted amine antioxidants exemplified by phenyl-naphthylamines as well as compounds such as phenylene diamines, phenothiazines, diphenylamines employed in amounts of between about 0.1 and 5 wt. %. Particularly preferred antioxidants are the phenyl-alpha-naphthylamines and a mixture of 2,2-diethyl-4,4'-t-diocetyl diphenylamine and 2,2'-diethyl-4,6-octyl diphenylamine. These antioxidants can also function as supplementary corrosion inhibitors.

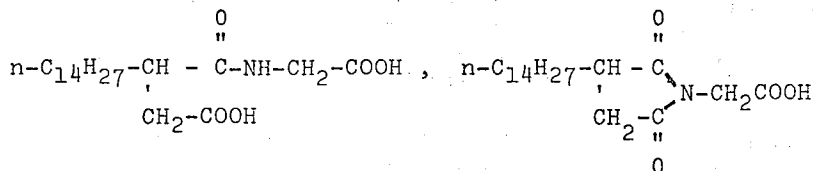
Additional examples of antioxidants are the hydrocarbyl dithiophosphates, particularly effective compounds in this class are the zinc di(nonylphenoxyethyl) dithiophosphate, zinc di(dodecylphenoxyethyl) dithiophosphate and zinc di-(nonylphenoxyethoxyethyl) dithiophosphate prepared by reacting nonylphenoxyethylene oxide compounds with phosphorus pentasulfide followed by neutralization of the acid formed with a basic zinc compound such as zinc carbonate, zinc oxide or zinc hydroxide. The general preparation and description of the compounds in this class is disclosed in U.S. Pat. Nos. 2,344,395 and 3,293,181.

The following examples further illustrate the invention but are not to be construed as limitations thereof.

EXAMPLE I

This example illustrates the preparation of the succinyl corrosion inhibiting component of the compositions of the invention.

A mixture of 1176 grams (6 moles) of 1-tetradecene and 588 grams (6 moles) of maleic anhydride were heated to reflux (197°C.) under nitrogen. Heating was continued until the temperature reached 230°C. (4 hours). The reaction was then cooled and the starting material was distilled under vacuum 2 mm Hg, 85°-95°C.) about 400 grams was distilled out. To the residue there was added 332.0 grams (4.5 moles) of glycine (aminoacetic acid) and 100 mls. of toluene. The mixture was then refluxed for 2 hours while azeotroping water out. There was collected 54 mls. (3 moles) of water via azeotrope. The product was identified to be a 2:1 weight mixture of N-(carboxylmethylene)-n-tetradecenyl succinamic acid and N-(carboxylmethylene)-n-tetradecenyl succinimide characterized by the formulas:



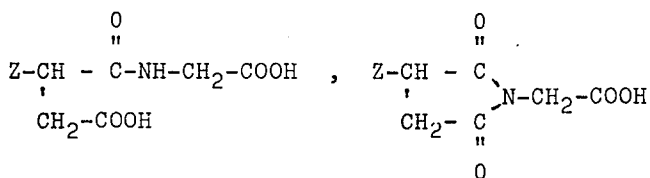
Analysis of the mixture found the following:

Tests	Observed	Calc'd
Wt. % C	67.5	68
Wt. % H	9.7	9.3
Wt. % N	3.6	3.9
Total Acid No. (TAN)	205	150 for 100% imide 300 for 100% amic acid

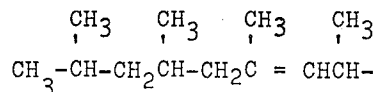
EXAMPLE II

This example further illustrates the preparation of the succinyl corrosion inhibiting component of the compositions contemplated herein.

To 270 grams (1 mole) of t-dodecenyl succinic anhydride in 350 mls. of toluene was added 75 grams (1 mole) of glycine. The reaction mixture was then heated to reflux under nitrogen for a 3.5 hour period while azeotroping water out. A total of 13.6 mls. of water was collected. This mixture was then filtered and solvent stripped to give 320 grams (97% yield) of product identified as a mixture of N-(carboxylmethylene)-t-dodecenyl succinamic acid and N-(carboxylmethylene)-t-dodecenyl succinimide in an amic acid to imide ratio of about 2:1, the amic acid and imide respectively characterized by the formulas:



where Z is



EXAMPLE III

This example still further illustrates the preparation of the corrosion inhibiting component of the mineral oil compositions contemplated herein.

The procedure of Example I was essentially repeated with the exception that 1008 grams of 1-decene were employed rather than the 1-tetradecene. The final product was identified as 2:1 weight mixture of N-(carboxylmethylene)-n-decenyl succinamic acid and N-(carboxylmethylene)-n-decenyl succinimide.

EXAMPLE IV

This example illustrates the mineral oil compositions contemplated herein and further demonstrates the superiority of the contemplated compositions over comparative compositions. The corrosion inhibiting ability of the representative and comparative compositions were measured in the ASTM-D 1748-70 Humidity Cabinet Test. Basically, this test comprises dipping steel panels in test oil allowing the excess test oil to drain and then suspend the oil coated test steel panel in a humidity cabinet at 120°F. until the oil fails, the greater the number of hours to failure the more effective the corrosion inhibiting properties of the test composition. A test surface is considered failing when it contains one or more dots of rust larger than 1 mm. in diameter or if it contains five rust dots of any size. In addition, at the end of 120 hours of being subjected to the humidity cabinet, the test surface is inspected and an estimate is made of the percent rust covering said surface. The less hours to failure and/or the greater the percent of rusting of the test panel, the less the corrosion inhibiting effectiveness of the protective oil composition.

The representative composition and the comparative compositions and the results of their testing in the humidity cabinet test are found below in Table I.

