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ANTICORROSIVE

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This invention deals with the use of alpha naphthyl ethers as addition agents to hydrocarbon oils and other organic substances. I have discovered that the presence of these compounds in suitable amounts reduces or inhibits the corrosiveness toward metallic surfaces of such hydrocarbon oils and other organic substances as possess this objectionable property.

Corrosiveness of organic substances may be inherent in their chemical structure or composition, or may be induced by oxidation. Either type of corrosiveness may be reduced, and in many instances be completely inhibited.

Suitable alpha naphthyl ethers are particularly the symmetrical dialpha naphthyl ether, the phenyl and alkyl phenyl alpha naphthyl ethers, such as tolyl, xylyl, trimethyl phenyl, tetramethyl phenyl, methyl ethyl phenyl, n-propyl phenyl, isopropyl phenyl, primary, secondary and tertiary butyl or amyl phenyl, ditertiary butyl phenyl, methyl ditertiary butyl phenyl, tritertiary butyl phenyl, ditertiary amyl phenyl, methyl ditertiary amyl phenyl, tritertiary amyl phenyl, etc., alpha naphthyl ethers; and alkyl or aralkyl alpha naphthyl ethers, such as methyl, ethyl, n-propyl, isopropyl, primary, secondary or tertiary amyl, hexyl, benzyl, etc., alpha naphthyl ethers. If desired, the aromatic nucleus or nuclei, e. g., the naphthyl radical, may contain one or several alkyl radicals.

It is of interest to note that the corresponding beta naphthyl ethers, and particularly the dibeta naphthyl ether, have very little inhibiting properties, and in some instances have been found to aggravate corrosiveness of substances to which they are added.

The alpha naphthyl ethers of this invention are thermally quite stable, and therefore are useful as addition agent to a large number of substances which are in need of improvement with regard to reduction of corrosiveness. Thus they may be added to gasolines, kerosenes, diesel fuels, lubricants, electrical oils, or to non-hydrocarbon substances such as fats, fatty acids, soaps, naphthenate driers, essential oils, extracts of pyrethrum, or other insecticides which lose their potency on exposure to air, etc. Of particular interest is the use of the alpha naphthyl ethers in lubricating oils containing corrosion-inducing amounts, e. g., from about .1%—5% of oil-soluble detergents such as salts of polyvalent metals, more particularly of Mg, Ca, Sr, Ba, Zn, Cd, Al, Sn, Pb, Cr, Mn, Fe, Ni, Co, Cu, with organic acids such as fatty acids, fatty acids having attached aromatic radicals as phenyl, hydroxy phenyl, benzyl, benzal, etc., radicals; naphthenic acids, acids obtained from natural waxes as montan wax, carnauba wax, candelilla wax, etc., acids obtained by oxidation of paraffin wax, acids obtained by hydrolysis of rosin oil or tall oil, alkyl-

ated benzoic, hydroxy benzoic, naphthoic, etc., acids, sulfonic acids, such as so-called mahogany acids, etc. It is known that these soaps cause lubricating oils to become more or less corrosive, particularly to alloy bearings, such as copper-lead, cadmium-silver, cadmium-nickel, etc.

The amounts of the ethers to be added varies somewhat depending upon the original corrosiveness or upon the tendency of the substance to increase in corrosiveness during storage or use or both. Thus, while lubricating oils and the like may require the use of amounts in excess of .2% and up to 5 to 10% to insure continued non-corrosiveness, particularly if such lubricating oils should contain corrosive addition compounds, smaller amounts usually are sufficient to inhibit cases of slight corrosiveness as is normal for example in gasolines, kerosenes, etc. in which amounts varying from .001% to 1% are normally sufficient.

As against alpha-naphthol, beta-naphthol, and many phenolic inhibitors, the alpha-naphthyl ethers have the advantage of being color stable in the presence of alkali. Many compounded lubricating oils for internal combustion engines contain alkaline detergents, and in the presence of free alkali the naphthols in particular turn to weird hues, as purple, green or blue.

The following example further illustrates my invention:

Samples of lubricating oils were subjected to a thrust-bearing corrosion test to determine their corrosiveness. In this test, a hardened steel disc is made to rotate for 20 hours under constant pressure against three flat alloy bearings. The bearing assembly rests in a steel cup filled with the oil to be tested. During the test, the temperature of the oil is maintained at 107° C. The bearings are weighed before and after the test, the difference in weight representing the loss sustained during the test.

The bearings reported below consisted of copper-lead alloy. The oils tested were of the type of anti-ringsticking diesel lubricating oil consisting of a 55 V. I. mineral lubricating oil S. A. E. 30 and containing a detergent soap which caused the oil to be quite corrosive. For comparison, the corrosiveness of the straight mineral oil is also shown:

Oil	Bearing loss, mg./sq. cm.
Mineral oil	0.20
Mineral oil+2.5% calcium petroleum sulfonate	5.7
Mineral oil+2.5% calcium petroleum sulfonate+1% di-alpha naphthyl ether	0.09
Mineral oil+2.5% calcium petroleum sulfonate+1% di-beta naphthyl ether	10.0

I claim as my invention:

1. A non-corrosive lubricating oil composition

comprising dissolved a small amount of a substance selected from the group consisting of di-alpha naphthyl ether and phenyl alpha naphthyl ether.

2. A non-corrosive lubricating oil composition 5 which normally causes corrosion containing dissolved a small amount of a substance selected from the group consisting of di-alpha naphthyl ether and phenyl alpha naphthyl ether.

3. A lubricating oil containing a corrosive 10 amount of an oil-soluble detergent salt and dissolved a small amount of a substance selected from the group consisting of di-alpha naphthyl ether and phenyl alpha naphthyl ether.

4. The composition of claim 3 wherein said small amount is between .1%-5%.

5. A non-corrosive lubricating oil composition comprising a lubricating oil which normally causes corrosion containing dissolved a small amount of phenyl alpha naphthyl ether.

6. A non-corrosive lubricating oil composition of claim 3 in which the ethers are present in amounts ranging from .001% to 10%.

7. A non-corrosive-lubricating oil composition comprising a lubricating oil which normally causes corrosion containing dissolved a small amount of di-alpha naphthyl ether.

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