United States Patent Office 3,498,800
Patented Mar. 3, 1970

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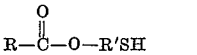
TARNISH PREVENTIVE AGENT

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No Drawing. Filed Sept. 11, 1967, Ser. No. 666,959
Int. Cl. C09d 5/08
U.S. Cl. 106—14 7 Claims

ABSTRACT OF THE DISCLOSURE

A composition suitable for prevention of tarnish on silver, copper, and other tarnishable metals, comprises at least one compound of the formula:



wherein R is an alkyl, cycloalkyl or alkaryl group having from 12 to 25 carbon atoms and R' is an alkylene group having 1 to 5 carbon atoms.

BACKGROUND OF THE INVENTION

This invention relates to an anti-tarnish composition for metals. In one aspect it relates to a metal polish composition including a mild abrasive agent for removal of tarnish, and an anti-tarnish compound of the above formula.

Tarnishable metals such as silver and copper are well known to tarnish rapidly in normal atmospheres. A housewife who owns silverware, a silver service, or copper utensils finds it necessary to polish these utensils frequently in order to maintain their attractive appearance.

A number of anti-tarnish agents have been suggested to prevent the tarnish of silver or copper. In general, these compounds attach to the metal, forming a thin invisible film which prevents the attack of sulfur or oxygen on the metal. One such anti-tarnish agent which has been proposed is a mercaptan having the general formula RSH where R is a C_{12} to C_{20} straight chain alkyl radical. It is theorized that such a molecule attaches to the metal through the sulfur atom, leaving the straight chain alkyl radical as a protective film on the surface. It is theorized that the alkyl chains upstanding from the surface are packed together so tightly by secondary valence forces that it is impossible for oxygen or sulfur compounds to penetrate the film and cause tarnishing of the metal.

Other sulfur-containing compounds have also been proposed as anti-tarnish agents. One of these, for example, is octadecyl thioglycolate which has the structural formula:

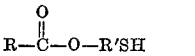


Although this compound contains the same functional groups as those in the compound of my invention it will be shown below that octadecyl thioglycolate is completely inferior to the compounds of my invention.

While the anti-tarnish agents of the prior art can be used alone, it is generally preferred for household use to incorporate such agents into a paste or liquid composition. Such a polishing compound will remove old tarnish through incorporation of a light abrasive agent, and will simultaneously treat the clean surface with the anti-tarnish agent to prevent future tarnish.

SUMMARY OF THE INVENTION

According to my invention I protect tarnishable metals by treatment with compounds of the formula:



wherein R is an alkyl, cycloalkyl or alkaryl group having from 12 to 25 carbon atoms and R' is an alkylene group having 1 to 5 carbon atoms.

DESCRIPTION OF PREFERRED EMBODIMENTS

Compounds exemplary of those within the scope of my invention are:

mercaptomethyl stearate
2-mercaptoethyl stearate
3-mercaptopropyl stearate
5-mercaptoamyl stearate
2-mercaptoethyl oleate
2-mercaptoethyl palmitate

The currently most preferred compound falling in the group above is 2-mercaptoethyl stearate.

Compounds having the generic formula having short chains are of higher volatility, and therefore somewhat difficult to handle in formulations. On the other hand, the longer chain compounds are difficult to mix because they are waxy or solid materials. The compound 2-mercaptoethyl stearate appears to have the best balance of properties of any compound within the genus, and, therefore, is the currently preferred material.

Although the generic formula given above encompasses branched chain alkyl and alkenyl groups, it is currently preferred that straight chain compounds be used.

While the compounds may be directly applied to previously cleaned metal, in the preferred embodiment, the anti-tarnish agent will be compounded into a polishing composition. Such a composition will include a finely divided abrasive polishing agent such as chalk, silica or alumina. Either natural or synthetic abrasive materials may be employed. Such abrasive powders are known in the prior art, as is illustrated in U.S. Patent 2,205,115.

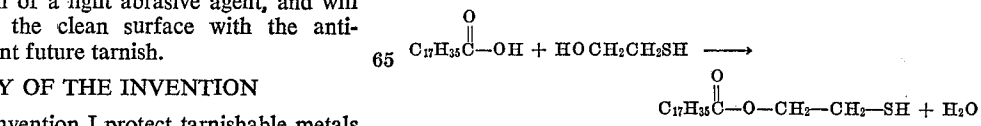
A satisfactory polishing composition will also include a diluent. The amount of diluent will depend upon the consistency of the polishing compound desired. In general, a polar solvent can be used as the diluent, with water or a lower alcohol being preferred.

The anti-tarnish agents of my invention have a somewhat unpleasant odor, and it is therefore desirable to add a perfuming agent to polish compositions which are intended for home use. Such agents are readily commercially available.

In order to prevent the abrasive powder from settling out of suspension a small quantity of suspending agent should be employed. Such agents are well known to those skilled in the art.

For example, a silver polish composition may be compounded with the following general ranges: 1 to 50 percent 2-mercaptoethyl stearate, 5 to 98 percent abrasive, 0 to 5 percent odorizer, and 0 to 1 percent suspending agent. Sufficient diluent, e.g. 1 to 90 parts, is then added to form a composition of the desired consistency.

The compounds of my invention can conveniently be formed by a direct esterification reaction of a long chain acid with a mercapto alcohol, in the presence of a catalyst as is known in the art. For example, 2-mercaptoethyl stearate can be formed by reacting stearic acid and 2-mercaptoethanol in the presence of p-toluenesulfonic acid catalyst, according to the following reaction:



This reaction is carried out in refluxing toluene, with the water being removed as formed using a reflux condenser and a Dean-Stark trap. The reaction product can be purified as desired.

EXAMPLE

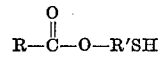
For purposes of comparison, clean silver and copper specimens were treated with 2-mercaptoethyl stearate and octadecyl thioglycolate, a known commercial tarnish inhibitor. These specimens, along with an untreated specimen were exposed for two months in a laboatory having air of high sulfur content. It is estimated that this laboratory exposure would be equivalent to at least a one year exposure to normal atmosphere. At the end of the test period, the control specimens of both silver and copper were heavily tarnished. Specimens treated with octadecyl thioglycolate were only slightly less tarnished. The specimens treated with 2-mercaptoethyl stearate had lost some of their luster, but showed virtually no indication of discoloration due to tarnish. These specimens are clearly superior to both the control and the octadecyl thioglycolate specimens.

Reasonable variation and modification are permissible within the scope of this disclosure and the appended claims without departing from the spirit of my invention.

I claim:

1. A silver and copper tarnish preventive composition consisting essentially of

(a) a compound of the formula



wherein R is an alkyl, cycloalkyl or alkaryl group having from 12 to 25 carbon atoms and R′ is an alkylene group having 1 to 5 carbon atoms, said compound being present in an amount from 1 to 50 percent by weight,

(b) an abrasive present in an amount of from 5 to 98 percent by weight,

(c) a diluent present in an amount from 1 to 90 percent by weight,

(d) an odorizer present in an amount from 0 to 5 percent by weight, and

(e) a suspending agent in an amount of from 0 to 1 percent by weight.

2. The composition of claim **1** wherein (b) is chalk, silica or alumina and (c) is a polar material selected from water and lower alcohols.

3. The composition of claim **1** wherein said compound is 2-mercaptoethyl stearate.

4. A method of preventing tarnish on silver and copper tarnishable metals comprising applying to said metals a composition according to claim **1**.

5. The method of claim **4** wherein said compound is 2-mercaptoethyl stearate.

6. An article of manufacture having a surface of silver or copper wherein said silver or copper surface is coated with a tarnish retarding composition consisting essentially of a mercapto ester having the formula as defined in claim **1**.

7. An article of manufacture as described in claim **6** wherein said mercapto ester is 2-mercaptoethyl stearate.

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U.S. Cl. X.R.

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