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ECOLOGICALLY SAFE ANTI-CORROSION METAL POLISHES

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ABSTRACT OF THE DISCLOSURE

The glyceryl mono-esters of higher fatty acids, preferably the 16–22 carbon straight chain saturated fatty acids and an abrasive constitute ecologically safe, tarnish resistant polishing and cleaning materials for bare metal objects.

This invention relates to a metal polish and more particularly, this invention relates to a composition containing a mild abrasive and an anti-tarnish agent which is non-toxic and bio-degradible.

The need to clean, polish and passivate bare decorative metal has long been appreciated. A substantial body of art exists on compositions and methods adapted to fill such need. However, such compositions have been formulated on a relatively simplistic basis. All that mattered was the suitability of the polishing composition for the intended purpose. In consequence, many of the materials suggested for metal cleaning and polishing compositions are toxic to the user or his environment. Now concern has arisen about whether such materials including for example, mineral acids, thioureas, nitro compounds and the like may constitute an actual danger to man or to his environment.

Certainly in the so-called consumer goods area considerable consideration should be given to whether the polishing composition is virtually fail safe. Thus, the housewife who likes to display her shiny copper, or stainless steel or aluminum housewares can hardly avoid close and prolonged contact with the polishing ingredients. In addition, residues will remain on the polished utensils. The motorist polishing the chrome trim on his automobile, the homeowner polishing fireplace andirons, brass door knobs and door knockers, the food cafeterias with literally square yards of stainless steel to keep clean are all exemplary instances wherein intimate and prolonged contact will occur between polishing ingredients and the skin and garments of an ultimate consumer. Not every consumer will know that tolerance limits may exist with exposure beyond such limits productive of deleterious results.

Certainly in a product whose use is almost optional special care should be taken to employ active ingredients that are safe and which will not leave harmful and difficult to remove residues.

It has now been discovered that glyceryl monoesters of higher saturated fatty acids constitute effective anti-tarnishing and corrosion resistant materials suitable for inclusion into abrasive cleansing and polishing preparations of an ecologically safe character. Preferred are the glyceryl monoesters of straight chain saturated 16–22 carbon fatty acids, notably palmitic, stearic, behenic acids. Mixtures of an abrasive powder and such a glyceryl monoester constitute effective metal polishes.

The metal polish may be compounded within the following weight proportions: 5–95% abrasive, 2–40% glyceryl monoester, the balance being variously solvents, odorizer, suspending agent, etc. Levigated alumina is a preferred abrasive. In a liquid formulation, up to about 50% may be made up of one or more volatile solvents.

The glyceryl monoester of a saturated fatty acid can, of course, occur in both the alpha and beta form and normally both are present in a technical grade monoester since a pure beta or a pure alpha glyceryl monoester will revert to some equilibrium mixture of alpha and beta monoesters. Accordingly, alpha monoesters, beta monoesters or mixtures thereof are contemplated within the sense of the term glyceryl monoester of a higher fatty acid.

The monoester and abrasive may be formulated as a liquid cleaning and polishing preparation or in the form of a paste or a cream. Further, the cleaning or polishing preparation may be formulated as a scouring powder or be impregnated into the fabric or braid of cleaning and polishing cloths.

The precise mechanism by which the saturated fatty acid monoester affords corrosion resistance for bare metal is not known. It is believed that the polar end of the glyceryl monoester becomes attached by one or more of the oxygen atoms to newly exposed metal surface and that the hydrocarbon chains of the higher fatty acid moieties then pack together to produce an invisible hydrophobic layer which protects the underlying metal surface. The glyceryl monoesters of higher fatty acids as known to be non-toxic materials, and the relatively small quantities thereof which could be ingested from a polish containing glyceryl monoesters can be tolerated, probably indefinitely. The glyceryl monoesters of higher fatty acids are bio-degradible and therefore are ecologically safe to the environment, likely far more so than are the ornamental metals protected thereby (e.g. copper).

Regardless of the accuracy of the above posed protection mechanism, it may be noted that glyceryl diesters formulated with abrasives and tested under the same conditions as the corresponding monoesters failed to protect bare metal articles against corrosion. In the instance of the glyceryl diesters of higher fatty acids, the polar oxygen groups are centrally located being in the middle of a long molecule formed at each end by the hydrocarbon moiety of the fatty acids and are therefore relatively inaccessible for reaction with the bare metal surface under polishing conditions. Similarly, the glyceryl triesters have the polar oxygen atoms centrally located and are largely shielded from reaction or interaction with the bare metal surface during polishing conditions by the hydrocarbon moieties of the fatty acids. Moreover, in the triesters no hydroxyl group is actually free to participate in a metathesis type reaction with a metal surface. As may be expected the glyceryl triesters were found to be non-protecting when tested against the monoesters under comparable conditions.

The monoesters of unsaturated acids are excluded from practice of this invention on practical and theoretical grounds. Unsaturation makes such monoesters more susceptible to undesired oxidative reactions. In addition the steric configuration of unsaturated hydrocarbon chains is believed to hinder the closeness of the molecule to molecule pack, making for less effective exclusion of atmospheric oxygen from the polished surface.

For further understanding of the invention the following specific examples thereof are presented.

EXAMPLE 1

To a solution of twenty parts of ethanol and thirty-three parts of methylene chloride, there was added five parts of glyceryl monostearate and five parts of levigated alumina.

This experimental polish was used on a strip of iron while a control strip was polished with only a mixture of the solvents and abrasive. After contact with moist paper for one hour the control strip was rusted while that polished with this experimental polish was not.

The experimental polish was used on a rectangle of aluminum sheet while a control strip was polished with only the solvents and levigated alumina. Each was contacted with paper moistened by a one percent aqueous solution of sodium hypochlorite. On drying, the treated rectangle remained bright and polished, while the control strip became corroded and pitted.

A strip of sheet copper was polished with this experimental polish while a control strip was polished with only the solvents and levigated alumina. Each was immersed for one day in a three percent aqueous solution of sodium chloride, then removed and wiped clean. The treated strip was bright while the control strip was tarnished.

A rectangle of brass was polished with this experimental polish and a control rectangle was polished with only the solvents and levigated alumina. Each was contacted for one hour by a strip of paper moistened with a three percent aqueous solution of sodium chloride. At the end of this time period the treated strip was unchanged, while the control strip showed corrosion over the entire contact area.

A strip of stainless steel was polished with this experimental polish while a control strip was polished with only the solvents and levigated alumina. Each was contacted for one hour with a strip of paper that had been dipped in a five percent aqueous solution of cupric chloride. At the end of this time period the control strip was extensively corroded while that treated with the experimental polish showed no visible corrosion.

EXAMPLE 2

To a solution of three hundred and eighty-five parts of ethanol and six hundred and twenty-eight parts of methylene chloride there was added twenty-four parts of glyceryl monopalmitate and twenty-four parts of levigated alumina.

This experimental polish was tested under the conditions described in Example 1, on samples, of iron, aluminum, copper, brass, and stainless steel and furnished and same protection against corrosion to the metal samples.

EXAMPLE 3

To a solution of forty-one parts of ethanol and sixty-six parts of methylene chloride, there was added ten parts of glyceryl monobehenate and ten parts of levigated alumina.

This experimental polish protected iron, aluminum, copper, brass and stainless steel samples from corrosion when tested in the manner as described in Example 1.

EXAMPLE 4

A polish paste was made of twelve parts of ethanol, fourteen parts of floated silica, and twelve parts of glyceryl monostearate.

A rectangular strip of iron was polished with this experimental polish and a control with a composition paste formed from solvent and abrasive only. Each was contacted with a strip of moist filter paper for one hour. At the end of this time the strip that had been polished with the experimental polish was free of rust while the control strip was rusted over the entire contact area.

EXAMPLE 5

A paste was prepared with sixteen parts of levigated alumina, eleven parts of glyceryl monostearate and six parts of mineral spirits.

A rectangle of aluminum sheet was polished with this experimental polish and a control was polished with a paste formed from the solvent and abrasive alone. Each rectangle was contacted with a paper strip that had been moistened with one percent aqueous sodium hypochlorite. Each was allowed to dry, then the paper strips were removed. The rectangle that had been polished with the experimental polish was not affected while the control strip was pitted over the entire contact area.

EXAMPLE 6

To a solution of two hundred and sixty-four parts of methylene chloride and one hundred and sixty-two parts of ethanol was added four parts of glyceryl monobehenate and four parts of chromium oxide.

A strip of iron was polished with this experimental mixture and a control strip with a mixture of only the solvents and the abrasive. Each strip was contacted with a moist strip of filter paper for one hour. At the end of this time the control sample was rusted over the entire surface, while that polished with the experimental mixture showed no rust.

What is claimed is:

1. A metal polish composition consisting essentially of a mixture of abrasive powder and a glyceryl monoester of a 16–22 carbon straight chain saturated fatty acid.

2. A metal polish composition containing as the active polishing and coating ingredients a mixture consisting essentially of about 2–40 percent by weight of a glyceryl monoester of a 16–22 carbon straight chain saturated fatty acid and at least 5 percent by weight of an abrasive powder.

3. The metal polish of claim **2** in which the glyceryl monoester is glyceryl monopalmitate.

4. The composition of claim **2** in which the glyceryl monoester is glyceryl monostearate.

5. The metal polish of claim **2** in which the glyceryl monoester is glyceryl monobehenate.

6. The metal polish composition of claim **3** wherein up to about 50 weight percent of volatile solvents are present.

7. An article having a bare metal surface which contains thereon a film consisting essentially of a glyceryl monoester of a 16–22 carbon straight chain saturated fatty acid whereby said metal surface is rendered tarnish resistant.

8. The article of claim **7** wherein the glyceryl monoester is glyceryl monopalmitate.

9. The article of claim **7** wherein the glyceryl monoester is glyceryl monostearate.

10. The article of claim **7** wherein the glyceryl monoester is glyceryl monobehenate.

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