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METAL CLEANER

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3 Claims. (Cl. 252—152)

This invention relates to metal cleaners, and more particularly to improved metal cleaners for industrial use at room temperature.

Many different materials have been used for cleaning metal parts. For example, mineral spirits and low boiling petroleum solvent products are still widely used in spite of the fact that they are inflammable, will not remove all types of soils and dirts, and in some instances, as when the parts are contaminated with soluble greases and the like, redistribute the soil leaving a film over the entire surface of the article which may interfere with subsequent cleaning or painting operations.

The fact that such materials are still widely used emphasizes the difficulty of compounding cleaning solutions that overcome these disadvantages without introducing other undesirable features. For example, chlorinated compounds have been used to some extent but must be selected with care to avoid toxic materials. Various aqueous solutions have been proposed, but many of these are highly alkaline and must be used with care in industrial operations.

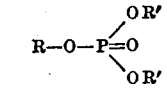
The present invention provides a metal cleaning solution that overcomes these disadvantages and which is particularly effective in cleaning metal surfaces, leaving the surfaces free of oily film and in a bright rust-free condition.

The cleaning solution may include from 10 to 40% of polyethylene glycol 400 mono laurate; 5 to 20% of amido sulfonate complex; 2 to 10% of diglycol oleate; 5 to 25% of a nonionic phosphate-derivative surface active agent; 5 to 20% of polyethylene glycol tertiary dodecyl thioether; 5 to 25% of an organic phosphate-derivative; 1 to 12% of rust inhibitor; and 1 to 10% of diethanolamine. Perfume or other odor-controlling compounds can be added in any desired amount. The compound can be used in the above form or it may be emulsified with up to three times its own volume of high boiling organic solvents such as ethers, ketones, alcohols, or aromatics.

The resulting mixture, either with or without the high boiling organic solvent, is added to water in the concentration necessary for the particular cleaning operation. From 2 to 10% of weight of the cleaning compound is usually adequate.

The amido sulfonate complex is a mixture of an alkyl aryl sulfonate with an alkylol amide. The product sold on the market with "Ninol" detergent under the trade designation "Ninex 21" is suitable for use, which product is marketed by Ninol Laboratories, Inc., and is a foam-stabilized detergent comprising essentially a combination of nonionic alkalolamide and alkyl aryl sulfonate.

The nonionic phosphate-derivative surface active agent comprises a medium alkyl group coupled through an oxygen atom to a phosphorous atom which, in turn, is bonded to three oxygen atoms, two of which are further connected with a suitable solubilizing group. A suitable material is sold under the trade designation of "Victawet 12," as octyl dipolyoxyethylene glycol ortho phosphate having the formula



where

R'=polyoxyethylene glycol chain, $(-C_2H_4O-)_nH$
R=2-ethyl hexyl

The organic phosphate-derivative may have the composition $Na_5R_5(P_3O_{10})_2$ where R designates an organic group such as a 2-ethyl hexyl radical, an iso-octyl group, or other organic groups having 4 to 12 carbon atoms.

The rust inhibitor may be produced from combinations of amines or amino derivative with organic acid orthophosphates, for example, by combining 38 parts of diethyl amino ethanol with 42 parts of mono-acid dioctyl orthophosphate. Other rust inhibitors such as those already on the market and well known can be substituted but the composition referred to above is preferred.

A preferred formulation of the above ingredients is as follows:

30% polyethylene glycol 400 mono laurate.
15% amido sulfonate complex (see above).
5% diglycol oleate.
10% nonionic phosphate-derivative surface active agent (see above).
12% polyethylene glycol tertiary dodecyl thioether.
15% organic phosphate-derivative (see above).
8% rust inhibitor (see above).
5% diethanolamine.

The formulation, when mixed with water, is not inflammable and meets the ends and objects set forth above. The cleaning solution has a high capacity for holding the soils in emulsion and preventing redistribution of soil. The drainage is rapid and the cleaner is effective in removing and holding many different types of soils thus resulting in economy in its use. The water solution as used for cleaning has a pH between about 6.4 and 7.0 and is harmless to skin or clothing. All quantities set forth in this description and in the claims are by weight unless otherwise stated.

We claim:

1. A metal cleaner comprising by weight 10 to 40 parts polyethylene glycol 400 mono laurate, 50 to 20 parts of an amido sulfonate complex comprising a mixture of an alkyl aryl sulfonate with an alkylol amide, 2 to 10 parts diglycol oleate, 5 to 25 parts of a nonionic phosphate-derivative surface active agent comprising an octyl dipolyoxyethylene glycol orthophosphate, 5 to 20 parts polyethylene glycol tertiary dodecyl thioether, 1 to 12 parts rust inhibitor, 1 to 10 parts diethanolamine and 5 to 25 parts of a compound having the formula $Na_5R_5(P_3O_{10})_2$ where R is an organic radical having between 4 and 12 carbon atoms.

2. A metal cleaner comprising by weight about 30 parts polyethylene glycol 400 mono laurate, 15 parts amido sulfonate complex comprising a mixture of an alkyl aryl sulfonate with an alkylol amide, 5 parts diglycol oleate, 10 parts of a nonionic phosphate-derivative surface active agent comprising an octyl dipolyoxyethylene glycol orthophosphate, 12 parts polyethylene glycol tertiary dodecyl thioether, 15 parts of a compound having the formula $Na_5R_5(P_3O_{10})_2$, where R is an organic radical having between 4 and 12 carbon atoms and 8 parts rust inhibitor, and 5 parts diethanolamine.

3. A metal cleaner as claimed in claim 2 wherein said rust inhibitor comprises 38 parts by weight of diethyl

) ethanol and 42 parts mono dioctyl acid ortho-
hate.

References Cited in the file of this patent

UNITED STATES PATENTS

2,332 Zimmer et al. ---------- Nov. 7, 1944

2,574,955 Bishop ---------- Nov. 13, 1951
2,758,093 Ernst et al. ---------- Aug. 7, 1956

OTHER REFERENCES

Surface Active Agents, by Schwartz et al., pp. 466–468, pub. by Interscience Pub., Inc., N.Y. (1949).