vertical adherence paint remover compositions

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The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty therefor.

This invention deals with compositions of matter which form thickened, alkaline-organic solvent, vertical adherence paint removers. It deals more particularly with thickened brush-on and spray-on paint removers for use on ferrous surfaces comprising highly alkaline detergents, surfactant soaps of fatty and resin acids, glycols, metallic soap thickeners and water. These materials are combined into stable, mucilaginous, anisotropic gels.

Conventional alkaline-organic solvent, vertical adherence paint removers have two disadvantages; namely, lack of storage stability and rapid evaporation of the organic solvent component after application of said remover to the surfaces which are to be stripped of paint. These disadvantages are traceable to two commonly used ingredients of such products. Most commercial vertical adherence paint removers are bodied with natural hydrophilic colloids of the carbohydrate or protein type, such as starch, flour or soybean meal. These agents are subject to hydrolytic decomposition in the presence of water in the composition, carbohydrates being particularly sensitive to this action in alkaline medium. As a result of this decomposition, the agents gradually lose their ability to form high viscosity colloidal solutions, and the remover mixture exhibits phase separation after a comparatively short storage life. The organic solvent component of vertical adherence paint strippers is usually methylene chloride, which has the disadvantage of an extremely high evaporation rate (vapor pressure 349 mm. Hg at 20° C.; boiling point 40.2° C.). Thus liquid methylene chloride point remover compositions require an upper aqueous seal to prevent evaporation. However, it is not possible to provide such a seal when using brush-on or spray-on paint remover compositions on vertical surfaces. In certain instances, paint remover compositions must function for extended periods of time, over-night for example. Obviously, large amounts of the solvent will evaporate over such long periods of time.

Therefore, an object of the present invention is the provision of an alkaline-organic solvent, vertical adherence paint remover compositions which are stable over long periods of time.

A further object is to provide paint remover compositions containing organic solvents of good paint solvency and film penetrability, which do not readily evaporate.

The foregoing and other objects and advantages, will become apparent from the following detailed description of the invention.

It has been found that the objectives of this invention are attained by the addition of a metallic soap or a suitable amount of specific glycols to a mixture comprising highly alkaline detergent compounds, surfactants such as soaps of fatty and/or resin acids and water. The alkaline detergent compounds may include sodium hydroxide, sodium orthosilicate, triodium phosphate or mixtures thereof. Examples of the surfactants which may be used are sodium resinate and the sodium salt of tall oil soap. Of the metallic soap thickeners which may be used, calcium stearate, calcium palmitate, aluminum palmitate and aluminum distearate are preferred. The specific glycols referred to herein possess good paint solvency and film penetrating and softening properties, as well as very low evaporation rates. For example, hexylene glycol has a boiling point of 197.1° C. and a vapor pressure of .02 mm. Hg at 20° C. Other examples of the specific glycols used herein are dipropylene glycol and 1,5-pentane-diol.

The paint stripping compositions herein referred to exhibit little synergism; that is, the gelled compositions upon standing exhibit no contraction nor extusion of liquid. They withstand alternate exposure to heat up to 115° F., and above and to cold down to — 40° F. and below without loss of stability. They are liquefied at 155° F., but regain their original consistency and adhesiveness on cooling to room temperature while undergoing continuous agitation.

In order that the invention may be further illustrated, following are examples of typical embodiments of the invention.

Example I

Component: Percent by weight of total composition

Sodium hydroxide: 7.8
Sodium resinate: 0.8
Water: 75.0
Aluminum distearate: 2.0
Hexylene glycol: 14.4

This composition is prepared by dissolving sodium hydroxide in water and then stirring in the sodium resinate. A slurry of the aluminum distearate in the hexylene glycol is then added to the batch of sodium hydroxide and sodium resinate. The resulting mixture is cooled to room temperature with continuous stirring. By means of a paint brush or by non-atomized spraying the resulting composition may be applied immediately to a surface from which paint is to be removed or it may be stored for long periods of time and then applied.

Example II

Component: Percent by weight of total composition

Sodium hydroxide: 7.9
Tall oil soap, sodium salt: 0.8
Water: 75.0
Calcium stearate: 1.6
Hexylene glycol: 14.7

This composition is prepared and used as in Example I.

Example III

Component: Percent by weight of total composition

Sodium hydroxide: 5.6
“Neo Fat 12”: 2.8
Trisodium phosphate (anhydrous): 0.9
Water: 74.8
Aluminum distearate: 2.8
Hexylene glycol: 13.1

The “Neo Fat 12” used in the above example is lauric acid, which forms the sodium soap in situ during the preparation of the paint remover. This composition is prepared and used as in Example I.

For optimum paint stripping efficiency, adhesiveness, consistency and stability, the various ingredient concentration ranges of the paint removers should be as follows: 7.5 to 9.0 percent alkaline detergent, 0.75 to 1.15 percent fatty acid or resin acid soap, 13.0 to 17.0 percent glycol, 72.0 to 75.0 percent water, and 1.7 to 3.0 percent metallic soap thickener, all percentages being by weight of the total composition.
To indicate the specificity of some of the aforementioned ingredients and concentration ranges, the following experiments were performed.

Using the preparation procedure of the composition of Example I, dipropylene glycol and 1,5-pentanediol were successively substituted for the hexylene glycol used in Example I. The resulting compositions were excellent paint removers when used on vertical surfaces. However, when 1,2,6-hexanetriol was substituted for the hexylene glycol, the resulting composition was too stiff to be brushable. Furthermore, diethylene glycol and triethylene glycol could not be successfully substituted for the hexylene glycol since non-adherent, curdy precipitates were formed. Finally, when propylene glycol was substituted for the hexylene glycol, compositions were obtained which exhibited excessive syneresis, that is, liquid separation.

Again using the procedure and composition of Example I, it was found that sodium orthosilicate and trisodium phosphate could be substituted for the sodium hydroxide in whole or in part. Excellent paint removing compositions for use on vertical surfaces were obtained. However, potassium hydroxide could not be substituted for the sodium hydroxide, since the resulting compositions were thin, non-adherent and subject to syneresis.

With reference to the concentration of the alkaline detergent, it was found that when the concentration of said detergent was increased, the compositions would not gel and considerable syneresis was noted. Thus when the amount of sodium hydroxide in Example I was increased successively to 11.5 percent, 15.4 percent and 19.5 percent, all percentages by weight of the total composition, the products were unsuitable for use as vertical adherence paint removers, exhibiting the non-gelling and syneresis characteristics noted above. The same adverse results were obtained when sodium orthosilicate or trisodium phosphate were substituted for the sodium hydroxide using the percentages enumerated above.

While the foregoing embodiments have been set forth in considerable detail, it is to be distinctly understood that many modifications and variations will naturally present themselves to those skilled in the art without departing from the spirit of this invention or the scope of the appended claim.

Having thus described the invention, what I claim and desire to secure by Letters Patent is:

A paint remover in the form of a thixotropic gel having the following composition by weight:

(a) 7.4 to 9% of sodium hydroxide;
(b) 13.0 to 17.0% of a glycol selected from the group consisting of:
   - hexylene glycol
   - dipropylene glycol
   - 1,5-pentanediol

(c) 0.75 to 1.15% of a surfactant selected from the group consisting of:
   - sodium laurate
   - sodium stearate
   - sodium salt of tall oil

(d) 1.7 to 3.0% of a soap selected from the group consisting of:
   - calcium stearate
   - calcium palmitate
   - aluminum palmate
   - aluminum stearate

(e) 72.0–75.0% water.

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JULIUS GREENWALD, Primary Examiner.