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## TREATMENT OF FABRICS WITH METALLIC SOAPS

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This invention relates to improvements in the treatment of fabrics, cordage, and other vibrous materials with metallic soaps.

It is known that certain water-insoluble soaps such as the naphthenates, stearates, and oleates of copper, zinc, cadmium, and other heavy metals form water-soluble complexes with ammonia and with some of the lower alkylamines. It is also known that if a fibrous material is soaked in an aqueous solution of such a soap complex and then dried, the ammonia or amine evaporates with the water, leaving a deposit of the simple, water-insoluble soap in the material. The usual purpose of this treatment is to protect fabrics, nets, cordage, and the like from fungi and other destructive organisms.

This method generally yields better results or is more practical than other processes having the same purpose, such as the treatment of fabrics with solutions of the metallic soap in naphtha or other volatile organic solvent. Nevertheless, objections have been found to treatment with complexes such as above described, both with ammonia and with the alkylamines as solubilizing agents.

The objection to the use of the ammonia complexes is their failure, in many or most cases, to deposit a uniform film or coating of the heavy metal soap on the fibre. The treatment consists in soaking the fibrous material in a rather highly diluted bath of the solution, pressing out or centrifuging the excess of liquid and finally drying in any convenient manner. As the material dries, the ammonia present in the aqueous phase evaporates more rapidly than the water, to the point at which there is insufficient ammonia present to maintain the soap in solution. At this point the soap separates out in small, semifluid droplets which attach themselves to the fibre and remain, after drying, as a multitude of minute spots rather than as an evenly distributed film. Thus the fibre is not fully protected against the attacks of organisms and the benefits which should inure to the treatment are not fully realized.

In this respect the complexes in which ammonia is replaced by one of the alkylamines are more satisfactory than the ammonia complex. The use of the alkylamines is handicapped, however, by the fact that only the lower members of this group are sufficiently water-soluble to form the desired complex, and that these lower members are themselves unduly volatile (though less so than ammonia) and are quite costly. This substitution, for these reasons, is not a wholly satisfactory solution to the problem of spotting.

I have discovered that the best results as regards even distribution of the protective soap may be obtained by adding to the ammonia complexes of the prior art a minor quantity of one of the alkylolamines. These bodies must not be confused with the alkylamines, from which they are distinguished chemically by the presence of a hydroxyl group and physically by their high boiling points and low vapor pressures. For example, the boiling point of monoethylamine is 16.6° C. and its vapor pressure at 20° is 825 mm. while the corresponding figures for monoethanolamine are 172° C. and 0.48 mm. All of the four alkylolamines commercially obtainable (mono-, di-, and triethanolamine and monoisopropanolamine) are monovalent bases and all are useful for the present purpose.

In making up the fabric treating solution I first prepare the usual ammonia complex by dissolving a fatty or naphthenic acid soap of the desired metal in dilute aqueous ammonia, the quantity of ammonia being at least sufficient to produce a clear solution. During or following the production of this solution I add a quantity of one or more of the above alkylolamines equal to from about 20% to about 40% of the weight of water-free soap used. In using oleic or stearic acid soaps it is desirable to add one of the lower aliphatic alcohols or ketones to avoid jelling of the complex, a step which is not required in the use of the naphthenates. Following are examples of typical treating solutions, each of which may be further diluted with water and/or aqueous ammonia if required. All parts are by weight.

*Example 1*

| | Parts |
|---|---|
| Copper naphthenate | 20 |
| Aqueous ammonia (28%) | 20 |
| Water | 60 |
| Monoethanolamine | 5 |

*Example 2*

| | Parts |
|---|---|
| Cadmium naphthenate | 5 |
| Aqueous ammonia | 10 |
| Water | 85 |
| Diethanolamine | 2 |

*Example 3*

| | Parts |
|---|---|
| Zinc naphthenate | 10 |
| Aqueous ammonia | 10 |
| Water | 80 |
| Triethanolamine | 2 |

*Example 4*

| | Parts |
|---|---|
| Zinc oleate | 5 |
| Copper oleate | 5 |
| Aqueous ammonia | 10 |
| Acetone | 10 |
| Water | 70 |
| Monoisopropanolamine | 3 |

The fibres of fabrics saturated with the above solutions, freed from excess solution and dried will be found on microscopic examination to be coated evenly with films of the soap and to be free from spotting. The mildly ammoniacal odor of the amine persists for some time after the fabric becomes air dry. Usually this odor is not objectionable.

The function of the alkylolamine in this treatment is to delay the precipitation of the soap which otherwise results from the evaporation of the ammonia. The amine, itself forming a water-soluble complex with the soap and being much less volatile than water, maintains the soap in solution so long as any water is present, and remains with the soap in the coating finally deposited on the fibre. On exposure to the air the amine slowly evaporates, but its presence in the interim does not reduce the protective value of the soap films.

I claim as my invention:

1. A treating solution for fibrous materials, comprising: a heavy metal soap of a soap-forming organic acid; water; ammonia in quantity sufficient to produce solution of said soap in said water, and a quantity of an alkylolamine sufficient to delay the precipitation of said soap which otherwise results from the evaporation of the ammonia.

2. A treating solution for fibrous materials, comprising: a heavy metal soap of a soap-forming organic acid; water; ammonia in quantity sufficient to produce solution of said soap in said water, and an alkylolamine selected from the group consisting of monoethanolamine, diethanolamine, triethanolamine, and monoisopropanolamine the quantity of said alkylolamine being sufficient to delay the precipitation of said soap which otherwise results from the evaporation of the ammonia.

3. A treating solution as recited in claim 1, in which said minor quantity of alkylolamine is from twenty percent to forty percent of the weight of said soap.

4. A treating solution as recited in claim 2, in which said minor quantity of alkylolamine is from twenty percent to forty percent of the weight of said soap.

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