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ALUMINUM STEARATE SOLUTION

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1

This invention relates in general to solutions of aluminum stearate and, more particularly, to aluminum stearate solutions of high concentration, and to correlated improvements in other compositions, such as, for example, waterproofing compositions, produced therefrom.

The waterproofing properties of aluminum stearate have been fully recognized and its use for this purpose is now well established. The most convenient method of applying aluminum stearate to various surfaces is to produce a solution thereof in a solvent therefor. Various organic solvents have been used in the preparation of aluminum stearate solutions, the more common ones including, among others, the hydrocarbons and their halogenated derivatives. While the foregoing practice has enjoyed some success, many difficulties have been encountered in view of the fact that when more than about 2% or 3% of the soap is dissolved in solvent, the resulting mass forms a stiff gel under atmospheric conditions thus rendering it substantially useless as a coating or waterproofing composition. While the gel can be heated to render it somewhat fluid, the application thereof in a heated state is entirely unsatisfactory for most purposes. The application of solutions containing from 2% to 3% of aluminum stearate is also highly impractical in view of the diluteness of the solution. Moreover, the cost is high due to the large amounts of solvent necessary.

Various proposals have been offered in an attempt to solve the foregoing problem by increasing the soap concentration without affecting the fluidity of the resulting solution. Peptizing agents such as acetic acid, phenol, tartaric acid, oxalic acid and the like have been used to increase soap concentrations in solvent mixtures without affecting the fluidity thereof. These proposals, however, have not proven to be very desirable commercially. Another proposal includes the use of the ethanolamines or the ethanolamine salts of the higher fatty acids for the purpose of increasing the concentration of aluminum stearate solutions. A solution produced according to this teaching also has its drawbacks.

The general object of the invention is to obviate the foregoing and other disadvantages.

A specific object of the invention is to provide an improved free-flowing concentrated aluminum stearate solution.

A further object of the invention is to provide an improved coating and waterproofing composition.

Another object of the invention is to provide

2

concentrated aluminum stearate solutions containing up to 50% of aluminum stearate.

Other objects will in part be obvious and will in part appear hereinafter.

It has now been found that the foregoing and other objects of the invention can be achieved by the use of a compound selected from the group consisting of mono-, di- and trialkyl esters of phosphoric acid containing a total of at least three carbon atoms in the various alkyl groups. According to the invention a relatively small proportion of such an alkyl ester of phosphoric acid is used in the process of dissolving aluminum stearate in suitable organic solvents. The quantity of phosphoric acid ester used is usually determined by the concentration as well as by the fluidity desired in the ultimate product. While any phosphoric acid ester falling in the above classification can be used, it is preferred to use dialkyl esters or a mixture of such esters. The compositions of the invention are particularly adapted for use in coating and waterproofing paper, textiles, leather and other similar materials and particularly in the waterproofing of building materials such as stone, concrete, bricks, wood and the like. The expressions "solution" and "dissolving" are used in a broad sense and they are to include dispersions and dispersing, respectively.

The invention accordingly comprises a composition of matter possessing the characteristics, properties and the relation of components which will be exemplified in the composition hereinafter described and the scope of the invention will be indicated in the claims.

In the preparation of the compositions of the invention any suitable solvent may be used, such as the hydrocarbons or their halogenated derivatives, examples of which include petroleum spirits, naphthas, gasolene, toluol, benzol, xylol, terpenes, carbon tetrachloride, trichloroethane, solvents such as "Amsco Solvent F" and "Varsol" which are hydrocarbon solvents having approximate boiling point ranges of from 175° C. to 215° C. and 150° C. to 205° C., respectively, etc. Oxygen-containing solvents such as alcohols, aldehydes, ketones, etc., may also be used in combination with the foregoing type.

The percentage of aluminum stearate present in the final composition may be varied up to 50% depending upon the particular use of the composition. Moreover, the quantity of phosphoric acid ester may likewise be varied to obtain the desired properties in the composition. Best results have been obtained by using an amount of phosphoric

acid ester within the range of about 0.25% to 20% by weight of the composition, the quantity used depending in part on the quantity of soap included. In general it may be said that the viscosity of the solutions will be proportional to the quantity of the soap contained therein, with the solutions of low concentration being very fluid and those of high concentration being more viscous.

The alkyl esters of phosphoric acid which we employ in the process of our invention are monoalkyl, dialkyl or trialkyl esters containing a total of at least three carbon atoms in the various alkyl groups. We prefer to utilize dialkyl esters, i. e., mono acid esters of phosphoric acid such as, for example, ethyl-octyl-acid-o-phosphate, dioctyl-acid-o-phosphate, isoamyl-octyl-acid-o-phosphate, diethyl-acid-o-phosphate, etc; however, if desired, the monoalkyl or trialkyl esters of phosphoric acid which contain a total of at least three carbon atoms in the various alkyl groups, e. g., monoamyl phosphoric acid, tributyl phosphate, triethyl phosphate, trimethyl phosphate, etc., may also be used in the process of our invention.

The aluminum stearate solutions may be prepared in any convenient manner. In most cases it is preferred to dissolve the thinning agent in the solvent and then add the aluminum stearate thereto. Preferably the mixture is heated to aid in dissolving the soap in the solvent. The solvent may be heated, if desired, to a temperature of from 80° C. to 100° C., for example, before addition of the soap thereto, or the mixture may be heated after the soap is added. However, any other suitable procedure may be utilized in preparing the compositions of the invention.

Suitable solvents other than those previously mentioned or appropriate mixtures of solvents may also be employed in preparing the products of our invention. The solvent or solvents to be used should be selected according to their boiling point in order to obtain the desired rate of evaporation. In applications where drying is to be effected at atmospheric conditions, solvents having a boiling point of 150° C. or less are recommended, while higher boiling solvents may be employed when drying is to be carried out under heat and/or under reduced pressure.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following examples which are given merely to further illustrate the invention and are not to be construed in a limiting sense, all parts given being by weight:

Example I

	Percent
Aluminum stearate	20
Ethyl-octyl-acid-o-phosphate	7
"Amsco Solvent F"	73

The foregoing composition is a free-flowing liquid and can readily be spread evenly on surfaces to be coated and/or waterproofed.

Example II

The following compositions are all similar to that of Example I and all have the same desirable characteristics thereof:

	Percent
A	
Aluminum stearate	20
Diethyl-acid-o-phosphate	7
"Amsco Solvent F"	73
B	
Aluminum stearate	20
Ethyl-octyl-acid-o-phosphate	7
Toluol	73
C	
Aluminum stearate	20
Monoamyl phosphoric acid	7
"Amsco Solvent F"	73
D	
Aluminum stearate	20
Dioctyl-acid-o-phosphate	7
"Amsco Solvent F"	73
E	
Aluminum stearate	20
Ethyl-octyl-acid-o-phosphate	7
"Varsol"	73
F	
Aluminum stearate	20
Ethyl-octyl-acid-o-phosphate	7
Carbon tetrachloride	73

Example III

Examples of other compositions wherein the thinning agents of the invention may advantageously be employed are:

	Percent
A	
Aluminum stearate	20
Ethyl-octyl-acid-o-phosphate	5
"Amsco Solvent F"	75
B	
Aluminum stearate	30
Ethyl-octyl-acid-o-phosphate	7
"Amsco Solvent F"	63
C	
Aluminum stearate	5
Ethyl-octyl-acid-o-phosphate	0.25
"Amsco Solvent F"	94.75
D	
Aluminum stearate	24.5
Ethyl-octyl-acid-o-phosphate	10.5
"Amsco Solvent F"	65
E	
Aluminum stearate	10
Ethyl-octyl-acid-o-phosphate	1
"Amsco Solvent F"	89
F	
Aluminum stearate	40
Ethyl-octyl-acid-o-phosphate	15
"Amsco Solvent F"	45
G	
Aluminum stearate	15
Ethyl-octyl-acid-o-phosphate	5
"Amsco Solvent F"	80

The above compositions are all free-flowing liquids at room temperature which may conveniently be used for coating, waterproofing or other suitable purposes.

Having described our invention, what we claim as new and desire to secure by Letters Patent is:

1. A free-flowing composition consisting essentially of from about 3% to about 50% of aluminum stearate, from about 0.25% to about 20% of an alkyl ester of phosphoric acid containing a total of at least three carbon atoms, and a liquid solvent for aluminum stearate selected from the group consisting of terpenes, aromatic hydrocarbons, aliphatic hydrocarbons, and chlorinated hydrocarbons.

2. A free-flowing composition consisting essentially of from about 3% to about 50% of aluminum stearate, from about 0.25% to about 20% of a dialkyl ester of phosphoric acid containing a total of at least three carbon atoms, and a liquid

solvent for aluminum stearate selected from the group consisting of terpenes, aromatic hydrocarbons, aliphatic hydrocarbons, and chlorinated hydrocarbons.

3. A free-flowing composition consisting essentially of from about 3% to about 50% of aluminum stearate, from about 0.25% to about 20% of a trialkyl ester of phosphoric acid containing a total of at least three carbon atoms, and a liquid solvent for aluminum stearate selected from a group consisting of terpenes, aromatic hydrocarbons, aliphatic hydrocarbons, and chlorinated hydrocarbons.

4. A free-flowing composition consisting essentially of from about 3% to about 50% of aluminum stearate, from about 0.25% to about 20% of a monoalkyl ester of phosphoric acid containing at least three carbon atoms, and a liquid solvent for aluminum stearate selected from the group consisting of terpenes, aromatic hydrocarbons, aliphatic hydrocarbons, and chlorinated hydrocarbons.

5. A free-flowing waterproofing composition consisting essentially of from about 3% to about 50% of aluminum stearate, from about 0.25% to about 20% of ethyl-octyl-acid-ortho-phosphate, and a liquid solvent for aluminum stearate selected from the group consisting of terpenes, aromatic hydrocarbons, aliphatic hydrocarbons, and chlorinated hydrocarbons.

6. A free-flowing waterproofing composition consisting essentially of from about 3% to about 50% of aluminum stearate, from about 0.25% to about 20% of dioctyl-acid-o-phosphate, and a liquid solvent for aluminum stearate selected from the group consisting of terpenes, aromatic hydrocarbons, aliphatic hydrocarbons, and chlorinated hydrocarbons.

7. A free-flowing waterproofing composition consisting essentially of from about 3% to about 50% of aluminum stearate, from about 0.25% to about 20% of monoamyl phosphoric acid, and a liquid solvent for aluminum stearate selected from the group consisting of terpenes, aromatic hydrocarbons, aliphatic hydrocarbons, and chlorinated hydrocarbons.

8. A free-flowing waterproofing composition consisting essentially of from about 3% to about 50% of aluminum stearate, from about 0.25% to about 20% of ethyl-octyl-acid-o-phosphate, and toluol.

9. A free-flowing waterproofing composition consisting essentially of from about 3% to about 50% of aluminum stearate, from about 0.25% to about 20% of ethyl-octyl-acid-o-phosphate, and petroleum spirits.

10. A free-flowing waterproofing composition consisting essentially of from about 3% to about 50% of aluminum stearate, from about 0.25% to about 50% of ethyl-octyl-acid-o-phosphate, and carbon tetrachloride.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,005,619	Graves	June 18, 1935
1,858,830	Kratoville	May 17, 1932