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POLYVALENT METAL SOAP COATING AND METHOD OF MANUFACTURE

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FIG. 1.



FIG. 2.



FIG. 3.

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POLYVALENT METAL SOAP COATING AND METHOD OF MANUFACTURE

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This invention relates to coating materials and methods of preparation thereof, and more particularly it relates to such coating materials in the form of polyvalent metal soaps.

A principal object of the invention is to provide an improved polyvalent metal soap composition and method of preparation thereof.

Another principal object is to provide a polyvalent metal soap composition which can be used to coat paper, cloth, metal, plastic film and the like, for a variety of uses such as release barrier papers, pressure sensitive films, antiseptic films, moisture protective barriers, etc.

A feature of the invention relates to an improved polyvalent metal soap composition in the form of an organic dispersion or emulsion, as distinguished from a solution of the soap, in a solution of an organic binder for the soap in a volatilizable organic solvent for the binder.

While aqueous dispersions or emulsions of polyvalent metal soaps have been comparatively successful in certain fields of use, it has been found that they have many disadvantages in other fields of use. For example when used as coatings for paper or other hygroscopic sheets, such aqueous dispersions require an extended drying time to drive off the aqueous constituent from the dispersion and from the sheet on which it is coated. Furthermore, when such aqueous dispersions of polyvalent metal soaps are applied to paper or to certain plastic films such as cellulose acetate film and then dried, it is extremely difficult to obtain a finished product which will lie flat, or without tendency to curl.

Furthermore, it has been found that water dispersions or water emulsions of polyvalent metal soaps are very complex systems and frequently have to be discarded as useless for certain purposes because of the difficulty of maintaining all the mixing and emulsifying conditions constant from batch to batch, if the desirable identical properties are to be obtained in the finished coating; not to mention the long time and care required for their preparation.

Accordingly, one of the principal objects of the present invention is to overcome the above-noted and other disadvantages inherent in the use of aqueous dispersions or emulsions of prior polyvalent metal soaps, by providing an emulsion or dispersion of a polyvalent metal soap or mixture of such soaps in a non-aqueous, i.e. organic, liquid medium or vehicle. In the following description the expression polyvalent metal soap denotes a salt formed by the interaction of a polyvalent metal with a fatty acid such as palmitic, stearic, hydroxystearic, sebacic, oleic, capric, caprylic, etc., having six or more carbon atoms in their structure. The polyvalent metal soap organic dispersions or emulsions of this invention have the advantage that they can be used as pigments, or masking coatings generally, and their hardness or abrasion resistance can be varied by changing the amount of resin binder used in the formulation. The larger the amount of resin used, the harder will be the coating.

Many metallic soaps form gels, or are partly or wholly soluble in certain organic solvents, which makes it necessary to select very carefully the dispersion medium or liquid in order to form a satisfactory dispersion with good coating or rheological properties. Furthermore, the polyvalent metal soap composition must not contain an organic solvent or solvent mixture which will have a marked effect on the polyvalent metal soap such as to make it

difficult or impractical to use for coating purposes. Yet the solvent or solvent mixture must be one in which the binder for the polyvalent metal soap is soluble.

Accordingly it is a feature of the present invention to provide a coating mixture of a polyvalent metal soap and a binder, using an organic dispersion liquid for the soap and in which the binder, such as a resin binder, is soluble, but without materially affecting the desirable coating properties or other properties of the polyvalent metal soap. The present invention is not limited to any particlar ratio of binder to polyvalent metal soap. The ratio of resin binder to polyvalent metal soap may vary from approximately 1 to 4 to approximately 1 to 25.

Another feature of the invention relates to a pressure-sensitive recording material having a light-transparent backing, for example of transparent plastic, and a substantially opaque or masking coating of a dried organic dispersion of a polyvalent metal soap or mixture of such soaps. This combination provides a novel form of recording blank which can have printed matter or designs formed in the opaque coating in response to any well known method, such for example as the pressure or impact of a printing type bar or the like. As a result the transparent backing is exposed at those particular areas where the pigmented opaque coating has been removed, thus enabling the blank to be used in light-projecting systems to project the recorded subject-matter on a suitable screen.

A further feature relates to a pressure-sensitive blank having a flexible backing of paper, cardboard, and the like, which is colored or dark in appearance, and which carries a superficial coating in the form of a dried dispersion of a polyvalent metal soap in an organic dispersion medium and thereby forms a whitish or light colored masking coating for the dark colored backing. Consequently the blank can be subjected to any suitable printing pressure or impact to remove the polyvalent metal soap in the desired areas, and by reason of the contrast between the non-removed coating and dark colored backing, the recorded subject-matter is easily readable.

A still further feature relates to a coated fabric, such for example as that used in making bandage materials, wherein the fabric carries a superficial coating produced by drying an organic dispersion of a polyvalent metal soap.

Other features and advantages not specifically enumerated will be apparent after a consideration of the following detailed descriptions and the appended claims.

In the drawing, which shows by way of example, certain preferred forms of articles embodying the invention,

FIG. 1 is a magnified sectional view of a novel recording blank having an opaque backing and a coating of a dried organic dispersion of a polyvalent metal soap;

FIG. 2 is a magnified cross-sectional view of a novel recording and projecting blank having a light-transparent backing and a coating of dried organic dispersion of a polyvalent metal soap;

FIG. 3 is a magnified cross-sectional view of a coated fabric according to the invention.

In general, the coating composition which forms one of the features of this invention may be said to consist of the following: a polyvalent metal soap to act as a pigmented or opaque coating; a resin to act as a binder for the polyvalent metal soap; and a dispersing liquid. The dispersing liquid is in the form an organic solvent or solvent mixture which must be a solvent for the binder and have little or no tendency to affect the polyvalent metal soap. Any well known plasticizer may be used for the resin if found desirable. Also, if desired, any well known coloring dyes or pigments may be added to supplement the inherent pigment character of the polyvalent metal soap organic dispersion. The following are typi-

cal examples of coating preparations including the organic dispersions of polyvalent metal soaps according to the invention.

Example #1

	G.
Methyl ethyl ketone	200.0
Saran F–120—200 viscosity (copolymer of vinylidene chloride and acrylonitrile) made by Dow Chemical Co	5.0
Calcium stearate	50.0

The Saran F–120 is dissolved in the methyl ethyl ketone by means of rapid agitation. The calcium stearate is then added under agitation. The dispersion may be colloid milled, or ball milled from one to six hours to make it smooth and more desirable for coating, for example by brush, coating rolls, wire-wound doctor rod, air knife, etc. When applied to a colored 18 lb. paper (24" x 36"—500 sheets), and dried, a coated paper having a coating of 0.15 to 0.50 ounce per square yard, was obtained. This coated paper was found satisfactory as a pressure sensitive recording paper or copy paper which can be used as described for example in U.S. Patent No. 2,313,808 and U.S. Patent No. 2,313,810.

Example #2

	G.
V.M. & P. naptha (boiling range 195° F.–360° F.)	100.0
Butyl methacrylate polymer (P–4 Polymer by E. I. du Pont)	2.5
Magnesium stearate	50.0
Butyl stearate (plasticizer)	1.0

The butyl methacrylate is dissolved in the V.M. & P. naptha by means of rapid agitation. The magnesium stearate is then added under agitation. The dispersion may be colloid milled, or ball milled from one to six hours to make it smooth and more desirable for coating by any of the well known coating methods.

Example #3

	G.
Ethyl alcohol	100.0
Polyvinyl butyral (mol. wt. approximately 10,000)	5.0
Zinc stearate	25.0

The polyvinyl butyral is dissolved in the ethyl alcohol by means of rapid agitation. The zinc stearate is then added under agitation. The dispersion may be colloid milled, or ball milled from one to six hours to make it smooth and satisfactory for coating by any of the well known coating methods. When applied to a light-weight cotton fabric to the extent of approximately 0.2 ounce per square yard, the coated fabric can be used as an antiseptic bandage material.

Example #4

	G.
Methyl ethyl ketone	100.0
Polyvinyl chloride acetate VYNS (Bakelite Corp.) (chloride to acetate ratio 90:10, mol. wt., approx. 16,000)	2.5
Calcium oleate	40.0

The polyvinyl chloride-acetate resin is dissolved in the methyl ethyl ketone by means of rapid agitation. The calcium oleate is then added under agitation. The dispersion may be colloid milled, or ball milled from one to six hours to make it smooth and satisfactory for coating. When applied to a light-weight paper to the extent of approximately 0.35 ounce per square yard, the product can be used as a water-resistant barrier material.

When the proper amount of coating material has been applied according to any of the above examples to the desired receiving surface, it is subjected to a heating or drying operation to remove the liquid constituents and to leave a continuous and smooth surface which is pigmented at least in great part by the polyvalent metal soap itself. Ordinarily this pigmentation is of a light or whitish color and of course any supplementary pigments or dyes may be added to modify that color.

FIG. 1 of the drawing shows in magnified cross section a typical pressure sensitive recording blank made in accordance with the invention. It comprises a flexible paper or cardboard backing sheet **10** on which is applied a coating **11** of a dried organic dispersion of a polyvalent metal soap and a resin binder such as referred to in any of the examples given hereinabove. After application of the coating, the sheet is dried to remove the liquid constituents, leaving the coating as a smooth continuous layer which is integrally adherent to the backing but is capable of being removed in localized areas by any well known recording operation, such for example as the pressure or impact of a type bar or any other similar printing member. In order to make the record readable, the paper **10** is of darkish color whereas the masking coating of the pigmented polyvalent metal soap is of a generally whitish color, thus enabling the recorded subject-matter to be readily observed by its visual contrast. Alternatively, it is possible to use a light-colored or whitish backing sheet, and obtain the desired contrast by adding a contrasting colored dye or pigment to the masking coating.

FIG. 2 shows the invention embodied in a recording blank suitable for light projection purposes. In this figure the numeral **12** represents any well known transparent backing material, such for example as any well known transparent plastic which carries a superficial opaque pigmented coating **13** in the form of the dried organic dispersion of the polyvalent metal soap, to which a dye or additional pigment may be added, as well as a resin binder according to any of the above examples.

FIG. 3 shows in magnified cross sectional view a coated fabric embodying the invention. The backing **14** is of any well-known woven, knitted, netted or similar foraminous material. It is provided with a coating **15** of a dried organic dispersion of a polyvalent metal soap and binder, such as those referred to in any of the examples hereinabove.

It will be understood, of course, that the invention is not limited to the manufacture of the coating material with a single polyvalent metal soap, and if desired two or more such polyvalent metal soaps may be used.

Furthermore, the invention is not limited to any particular thickness or hardness for the pressure sensitive coating, which may be applied in one or in a series of successive passes if desired.

Various changes and modifications may be made in the disclosed embodiments without departing from the spirit and scope of the invention.

What is claimed is:

1. An opaque coating mixture for application as a substantially continuous opaque coating on a surface, which mixture comprises a polyvalent metal soap of a fatty acid having from six through eighteen carbon atoms, said soap being dispersed undissolved throughout an organic and liquid dispersion medium inert to the said soap and having a synthetic resin binder and an organic solvent which dissolves the binder and is otherwise inert to it and is also inert to the soap; said binder being inert to and capable of holding the soap dispersed undissolved in it after the mixture is applied to the surface, and of binding the soap to said surface even after evaporation of the solvent; the soap being present in an amount in excess of that of the binder which latter is at least two percent of the total amount of soap and binder; the ingredients being so proportioned to one another for the mixture to be spreadable over the surface over which it is to be coated and for the dispersion of soap in binder to remain fixed as an opaque coating on the surface after evaporation of the solvent; the opacity of this coating being displaceable wherever the coating is placed under impact pressure such as by application of a writing stylus

or typewriter key, whereby such thus applied impression easily is legible.

2. A coating mixture as claimed in claim 1, wherein the binder is from about four to about twenty-five percent of the total amount of the soap and binder.

3. An opaque coating mixture for application as a substantially continuous opaque coating on a surface, which mixture comprises a polyvalent metal soap of a fatty acid having from six through eighteen carbon atoms, said soap being dispersed undissolved throughout an organic and liquid dispersion medium inert to the said soap and having (*a*) a synthetic resin binder selected from the class consisting of a copolymer of vinylidene chloride and acrylonitrile, a butyl methacrylate polymer, polyvinyl butyral of molecular weight of about 10,000, and polyvinyl chloride acetate of molecular weight of about 16,000 and chloride to acetate being in the ratio of 90 to 10; and (*b*) an organic solvent which dissolves the binder and is otherwise inert to it and is also inert to the soap; said binder being inert to and capable of holding the soap dispersed undissolved in it after the mixture is applied to the surface, and of binding the soap to said surface even after evaporation of the solvent; the soap being present in an amount in excess of that of the binder which latter is from about four percent to about twenty-five percent of the total amount of soap and binder; the ingredients being so proportioned to one another for the mixture to be spreadable over the surface over which it is to be coated and for the dispersion of soap in binder to remain fixed as an opaque coating on the surface after evaporation of the solvent; the opacity of this coating being displaceable wherever the coating is placed under impact pressure such as by application of a writing stylus or typewriter key, whereby such thus applied impression easily is legible.

4. A recording blank comprising a backing member and on it an opaque coating in the form of a dry organic dispersion of a polyvalent metal soap of a fatty acid having from six through eighteen carbon atoms throughout a synthetic resin binder for and inert to said soap and which binds the soap to the backing member and is at least two percent of the total amount of soap and binder, and the amount of soap exceeds that of the binder.

5. A recording blank as claimed in claim 4, wherein the binder is from about four to about twenty-five percent of the total amount of the soap and binder.

6. A recording blank as claimed in claim 4, wherein the binder is from about four percent to about twenty-five percent of the total amount of the soap and binder, and the binder is a member of the class consisting of a copolymer of vinylidene chloride and acrylonitrile, a butyl methacrylate polymer, polyvinyl butyral of molecular weight of about 10,000, and polyvinyl chloride acetate

of molecular weight of about 16,000 and chloride to acetate being in the ratio of 90 to 10.

7. A recording blank as claimed in claim 6, wherein a pigment is distributed throughout the coating to give it a color contrasting with that of the backing member.

8. A recording blank as claimed in claim 6, wherein the backing member is transparent and the coating is substantially opaque.

9. The method of preparing a pressure sensitive recording blank, which comprises dissolving a synthetic resin binder in a volatilizable organic solvent for it, homogeneously dispersing in the resulting solution a polyvalent metal soap of a fatty acid having from six through eighteen carbon atoms and in an amount in excess of the binder, the solvent for the binder being otherwise inert to it and also inert to said soap, the amount of binder being at least two percent of the total of binder and soap; the soap, binder and solvent being so proportioned to one another to enable the resulting dispersion to be spreadable; spreading the dispersion over a surface of a backing member; and volatilizing the solvent from the layer of the dispersion on said member thereby leaving bound to and on it an opaque layer of the soap distributed throughout the binder.

10. The method as claimed in claim 9, wherein the binder is from about four to about twenty-five percent of the total amount of the soap and binder.

11. The method as claimed in claim 9, wherein the binder is a member of the class consisting of a copolymer of vinylidene chloride and acrylonitrile, a butyl methacrylate polymer, polyvinyl butyral of molecular weight of about 10,000, and polyvinyl chloride acetate of molecular weight of about 16,000 and chloride to acetate being in the ratio of 90 to 10.

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