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METALLIC SOAP DISPERSIONS

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The present invention relates to metallic soap dispersions. More specifically, the present invention relates to stable aqueous dispersions of compounds of metals and fatty acids normally insoluble in water and known as metallic soaps.

Although dispersions of metallic soaps of various types are known in the art, in general, making dispersions of this character involved dissolving the metallic soap in an organic solvent as for example kerosene or molten paraffin wax and thereafter adding to the solution with rapid stirring a dispersing agent such as sulfonated tallow, sulfonated oil or the like. In general, however, dispersions of this type consisted predominately of these other ingredients, i. e. the solvent and the dispersing agent together with a relatively small amount of metallic soap. Many of the metallic soap dispersions of the character described were also incapable of being diluted inasmuch as they partook of the characteristics of water-in-oil emulsions rather than oil-in-water emulsions.

It is one of the objects of the present invention, therefore, to provide a metallic soap dispersion wherein the metallic soap forms the major part of the dispersion and the dispersing agent is present only in minor proportions.

A second object of the present invention is to provide a metallic soap dispersion which is capable of being diluted with water without breaking the same.

A third object of the present invention is to provide an aqueous metallic soap dispersion including water, metallic soap and a relatively small amount of a mono-ester of a fatty acid of from 10-24 carbon atoms with a polyethylene glycol having a molecular weight in excess of approximately 200.

A fourth object of the present invention is to provide a process for increasing the gloss and brightness of paper which comprises coating the same with a dispersion of the character hereinbefore set forth.

A fifth object of the present invention is to provide a metallic soap dispersion which is particularly suitable for coating paper, waterproofing leather and for defoaming foamable substances such as glue solutions or pulp solutions.

Other objects and advantages of the present invention will be apparent from the description and claims herein.

In accordance with the present invention, it has been found that a stable dispersion of various types of metallic soap in water can be made utilizing as a dispersing agent a polyethylene

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glycol mono-ester of a fatty acid. Examples of this type of compound are those derived by the interaction of "polyethylene glycol 400" (a mixture of polyglycols having a molecular weight of approximately 400 and consisting predominately of nonaethylene glycol) and various fatty acids having carbon chains of from 10-24. Other polyethylene glycols may also be used although in general it has been found that the polyglycol should have a molecular weight of 200 or above. Thus suitable compositions may be produced by the interaction of "polyethylene glycol 200" (predominately tetraethylene glycol having an average molecular weight of approximately 200), "polyethylene glycol 300" (predominately hexaethylene glycol with a molecular weight of approximately 300) with fatty acids.

In addition to these commercial mixtures, pure polyethylene glycols above tetraethylene glycol may also be used. As to the fatty acids which may be esterified by these glycols, any fatty acid having from 10 to 24 carbon atoms, such as lauric acid, oleic acid and stearic acid, as well as oils containing these acids, such as mustardseed oil, coconut oil and other naturally occurring oils, may be used. As previously stated, any of the fatty acids having between 10 and 24 carbon atoms in the chain are suitable and the natural glycerides and other fatty compositions may also be used.

In general it has been found that when more than one part of polyglycol mono-ester of the character hereinbefore described is utilized with each 10 parts of metallic soap, a stable dispersion may be produced without the use of high-speed stirring apparatus, colloid mills or the like. Examples of metallic soaps which can be efficiently dispersed by means of the polyethylene glycol mono-ester are lead stearate, calcium stearate, barium stearate, magnesium stearate, cadmium stearate, aluminum stearate, zinc stearate, aluminum palmitate, aluminum oleate, etc. Preferably the dispersions produced contain approximately 50% of metallic soap and dispersing agent and approximately 50% of water although, as before stated, once the dispersion has been produced, the same can be diluted to any desired extent. Dispersions of this character have been found particularly desirable for use in the coating of paper inasmuch as when so used in combination with the usual coating ingredients the resultant paper has been found to have a superior brightness and gloss. As may be understood, in addition to the metallic soap the coating compositions usually contain a solubilized

starch or casein such as chlorinated starch or ammonia-treated casein as well as various fillers and pigments such as clay, titanium dioxide, etc.

In general in producing the coating composition in accordance with the present invention, an emulsion is prepared of the starch or casein and thereafter it is added to a suspension of the clay, water and the metallic soap ingredient. Metallic soaps of calcium have been found particularly desirable for use in coating compositions of this character.

The following examples illustrate the present invention but are not intended to limit the same.

Example I

58 parts by weight of mustard-seed oil, 40 parts by weight of "polyethylene glycol 400" and 2 parts by weight of dry KOH were mixed and reacted at a temperature of between 90 and 100° C. for approximately three hours. Approximately 100 parts of mainly nonaethylene glycol ester of oleic acid together with other reaction products is produced. The impure product, however, is suitable for use as a dispersing agent in accordance with the present invention.

Example II

34.6 parts of coconut fatty acids and 65.4 parts of "polyethylene glycol 400" were mixed and reacted at 150–240° C. with removal of water until the acid value was below 10. The resultant product consisted largely of nonaethylene glycol ester of lauric acid.

Example III

10 parts of the ester of Example I and 50 parts of water were thoroughly mixed. Thereafter 40 parts of calcium stearate were added and the water, ester and calcium stearate thoroughly stirred. A milky thick suspension of the calcium stearate was produced which was stable indefinitely. This dispersion could be diluted with almost any amount of water. The resultant diluted dispersions were stable for relatively long periods of time and any separation occurring in the diluted dispersions could be easily overcome by simple shaking or mixing.

Example IV

Five parts of casein were mixed with 20 parts of water and 1.3 parts of ammonium hydroxide. The casein, water and ammonium hydroxide were warmed for a short period in order to thoroughly dissolve the casein. Thereafter 60 parts of clay, 60 parts of water, $\frac{1}{2}$ parts of sodium tetraphosphate and 2.4 parts of the calcium stearate dispersion of Example III were mixed together to form a homogeneous dispersion. Then the emulsion of casein and water was added and the two mixed together thoroughly. The resultant coating slurry was used to coat paper and the same was found to have an increased gloss and brightness as compared to the identical coating slurry with the calcium stearate omitted.

Example V

10 parts of chlorinated starch were mixed with 25 parts of water. Thereafter a separate mixture was made of 30 parts of clay, 1 part of soda ash, 34 parts of water and 1.6 parts of the calcium stearate dispersion of Example III. The two mixtures were then mixed together and the resultant slurry used to coat paper. Here again superior results were obtained as compared to the same slurry with the omission of the calcium stearate.

Example VI

10 parts of the ester of Example I and 50 parts of water were mixed together. Thereafter, 40 parts of zinc stearate were added to the water and ester and the entire mass agitated to produce a homogeneous dispersion. Samples of this dispersion did not separate after several weeks. The original dispersion could be diluted with several parts of water and the resulting diluted dispersions were stable for a period of several days.

Example VII

5 parts of the ester of Example II and 55 parts of water were mixed together. Thereafter 40 parts of zinc stearate were added to the water and ester and the entire mass agitated to produce a homogeneous dispersion. Samples of this dispersion were stable indefinitely.

Example VIII

10 parts of "polyethylene glycol 600" mono-oleate and 100 parts of water were mixed together. Thereafter 40 parts of aluminum stearate were added to the water and ester and the entire mass agitated to produce a homogeneous dispersion. This particular dispersion was especially desirable for treating an alum-tanned leather in order to reduce the ability of the leather to take up water. The emulsion was stable in the presence of alum and salt. It is to be noted that "polyethylene glycol 600" is a commercially available mixture of polyethylene glycols having an average molecular weight of 600. The "polyethylene glycol 600" mono-oleate was produced similarly to the ester of Example II.

The metallic soap dispersions of the present invention are not only suitable for the coating of paper but also for waterproofing various materials as, for example, leather. Because of their high degree of stability in acid solutions, they can be used in conjunction with tanning baths and the like and as previously pointed out are especially desirable for reducing the hygroscopic characteristics of alum-tanned leather. In addition, a small amount (approximately 1%) of the dispersion can be used to reduce the foaming of various solutions as in paper making and glue solutions.

It is to be noted that the ester employed as a dispersing agent is essentially nonionic in character. Although the KOH used in Example I introduces ionic matter into this particular reaction, the quantity present is so small that the resulting ester remains substantially nonionic.

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

1. An aqueous metallic soap emulsion which comprises an emulsion having water as the continuous phase, water-insoluble metallic soap in the discontinuous phase, and a water-compatible substantially nonionic ester of a fatty acid containing 10 to 24 carbon atoms per molecule with a polyethylene glycol having a molecular weight in excess of approximately 200 as the emulsifying agent.

2. An emulsion as defined in claim 1 in which at least 1 part by weight of the ester is present for each 8 parts by weight of the metallic soap.

3. An emulsion as defined in claim 1 in which 4 to 8 parts by weight of the metallic soap are present for each part by weight of the ester.

4. An emulsion as defined in claim 1 in which the metallic soap comprises calcium stearate.

5. An emulsion as defined in claim 1 in which the metallic soap comprises aluminum stearate.

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6. An emulsion as defined in claim 1 in which the metallic soap comprises zinc stearate.

7. An emulsion as defined in claim 1 in which the ester comprises nonaethylene glycol mono-stearate.

8. An emulsion as defined in claim 1 in which the ester comprises nonaethylene glycol mono-laurate.

9. An emulsion as defined in claim 1 in which the ester comprises nonaethylene glycol mono-oleate.

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