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SURFACE ACTIVE MATERIALS

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The present invention relates to nitrogenous complexes, and it particularly relates to condensation, addition or polymerization products which may be used as dispersing and emulsifying agents or in general where surface-active materials are to be utilized.

Although the present invention will be most particularly described in its application to heterocyclic nitrogen containing ring compounds, such as morpholine, it is to be understood it also may be utilized in connection with other similar ring compounds.

It is among the objects of the present invention to make improved surface active complexes which are particularly useful as emulsifying or dispersing agents and which may be inexpensively manufactured and readily utilized in a wide variety of materials with either aqueous or non-aqueous bases for dispersing purposes and which will give enhanced surface-active properties, whether in connection with liquid or oil dispersions of finely divided solids, such as pigments, colloids, powders and so forth, and which at the same time may be readily utilized in combination with fatty acid or alcohol compounds or with glyceride esters and various oils, waxes or fats.

Still further objects and advantages will appear from the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the invention.

It has been found that morpholine is particularly satisfactory for this purpose and that morpholine may be combined most satisfactorily with high molecular weight aliphatic compounds and particularly saturated or unsaturated straight chain aliphatic compounds containing from 12 to 36 carbon atoms and if desired one or more hydroxy, nitro, carboxy, sulpho, amino, keto, alkyl, aryl, or other substituent groups, which compounds may consist of the waxes, fats or oils, or the free fatty acids, or the fatty alcohols or various sulphonated, sulphated, borated, phosphated or other derivatives thereof.

The morpholine not only appears to form complex salts or addition products with various fatty acid or alkyl carboxylic compounds or acid groups therein, but it also apparently may be further condensed to form various amido-like compounds.

It also appears that the morpholine may react directly with the various esters of these compounds, and particularly with the glyceride esters usually occurring in oils, fats and waxes to produce complex products, which have high surface-active properties in either aqueous or oily media.

Moreover it has been found that these complexes when heated after being deposited as a coating or film most readily decompose with the removal of the morpholine and the deposition of substantially insoluble aliphatic or fatty acid or alcohol residues, which apparently are in thoroughly dispersed or gelatinized condition and will form a most permanent coating or surface film, whether upon fabrics or various other surfaces.

Although the morpholine and less preferably its chlorinated, nitrated, hydroxylated, carboxylated, arylated or alkylated derivatives may be reacted directly with high molecular weight aliphatic materials, such as the fatty acids themselves or even tertiary alcohol derivatives, sulpho derivatives, boro derivatives, or phospho derivatives of high molecular weight aliphatic compounds, it has been found most suitable to react the triglyceride or other esters in the form of oils, fats or waxes directly with the morpholine and desirably under pressure at an elevated temperature.

The morpholine may be reacted in molal proportions varying from 3 mols of the morpholine to 1 mol of the tri-glyceride to 1 mol of the morpholine to 1 mol of the tri-glyceride at temperatures varying from 80° C. to 200° C., and preferably between 90 and 150° C., for periods ranging from 1 to 20 hours and for pressures ranging from atmospheric up to as much as 15 atmospheres.

Although desirable products are obtained by merely forming the morpholine or substituted morpholine salts with the fatty acids or with their esters by splitting off the glycerol or other esterifying compound, it has been found desirable in some instances to cause a condensation to take place so that additional water is split off.

The morpholine complexes obtained may be used for finishing textiles, for emulsifying, wetting and detergent agents and they also are particularly suitable for use even in pigment suspensions in various types of drying, semi-drying and non-drying oils.

For example, it has been found that a particularly satisfactory derivative may be made by reacting linseed oil, China-wood oil or tung oils with an equivalent of 3 mols of the morpholine to each mol of the tri-glyceride in an autoclave at 135° C. for a period of 10 hours.

The final complex may be added directly to various types of drying or semi-drying oil bases for dispersing pigments, such as organic lakes

such as insoluble azo or other dyes or inorganic colors, such as titanium oxide, chrome oxide, red lead, lead sulphate, lithopone, iron oxide, and so forth.

It is found that when the film is made from this material, morpholine may be driven off, leaving the fatty acid without destroying or injuring the film and giving the film high water resistant properties and stability.

After finishing, the fabric or textile may be heated, with the result that the morpholine will be removed and there will be left upon the fabric a permanent finish in the form of a thin film of the fatty compound, which will be highly resistant to laundering or washing.

Although not restricted thereto, it has been found particularly desirable where a drying oil base is employed to use the morpholine derivative of such oil or a closely similar oil, with or without added resins.

Similarly, where water emulsions are employed, it has been found most desirable to use morpholine derivatives of the dispersed oils or oil which is placed in emulsified form in the leather, fur, textile or other treating emulsion.

It has been found that particularly suitable dispersions, both in oil and water, of rubber, urea formaldehyde resins, nitro-cellulose, rubber hydro-chlorides and so forth, may be made with the complexes of 3 mols of morpholine with 1 mol of glyceride oil such as linseed oil, perilla oil or castor oil.

With the morpholine complexes of the present application, phenol formaldehyde resins, as well as other phenolic resins may be made more readily soluble, both in oil and more readily dispersible in water.

It has been found also that the morpholine products appear to intensify the action of driers and that many metal compounds, such as cobalt, lead and zinc may be added without discoloration.

Combinations of glyptal resins with castor oil, chlorinated rubber with China-wood oil and phenolic resins with perilla oil may be readily made with use of as little as 1 to 3% of the morpholine product.

Moreover, by use of this morpholine product, it is readily possible to obtain dull finishes without adding heavy metal fatty acid soaps and at the same time it is possible to obtain a compatible solution, which upon drying and heating will result in a homogeneous mixture of non-compatible materials, due to release of the morpholine and deposition of the fatty compound in situ.

Although the exact character of the combination between the morpholine and the fatty acid glyceride or oil wax or fat is not certain, apparently there may be a similar reaction as occurs in connection with a combination between cyanacetic acid, ethyl ester and the morpholine in which the carbon atom of the carboxy group bonds itself to the nitrogen of the morpholine, with the double bond to the oxygen item of the carboxy group being converted into a single bond because of conversion of said oxygen to hydroxy when such oxygen takes up the hydrogen which has been connected to the nitrogen group.

Although it is not certain that this type of addition product is formed, it does seem that this offers the most plausible theory of what occurs.

Although the complex of the morpholine and fatty acid glyceride may be added to oils directly without discoloration, this is not true of morpholine itself, which will always cause discoloration, particularly in the presence of driers.

The morpholine complex of the present invention may be readily combined with pigments either in wet pulp form or in oil dispersions and as a general rule, a much better dispersion is obtained even where there has not been substantial grinding or when a very fine pigment has not been produced.

As many changes could be made in the foregoing processes, and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A method of making a water-proof surfacing which comprises forming a dispersion of a morpholine compound of a glyceride oil in a liquid surfacing medium, forming a film from the dispersion and then heating the film to drive off the morpholine.

2. A process of forming water-proof films, which comprises dispersing a morpholine condensation product of a glyceride oil in an oil, using such oil to form a film and then heating the film to drive off the morpholine.

3. A process of forming water-proof films, which comprises dispersing a morpholine condensation product of a glyceride oil in water, using such water as a surfacing to form a film and then heating the film to drive off the morpholine.

4. A process of forming water-proof films, which comprises dispersing a morpholine condensation product of a glyceride oil in an oil, using such oil to form a film and then heating the film to drive off the morpholine, said glyceride oil being a drying oil.

5. A process of forming water-proof films, which comprises dispersing a morpholine condensation product of a glyceride oil in an oil, using such oil to form a film and then heating the film to drive off the morpholine, said glyceride oil being linseed oil.

6. A process of forming water-proof films, which comprises dispersing a morpholine condensation product of a glyceride oil in an oil, using such oil to form a film and then heating the film to drive off the morpholine, said condensation product consisting of a combination of three mols of morpholine with one mol of a glyceride.

7. The process which consists of combining morpholine with glyceride oil to form a liquid morpholine condensation product of such oil, using said product to form a film and then splitting off the morpholine.

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