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ROSIN SIZE

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This invention relates to an aqueous rosin size dispersion. More particularly, it relates to an aqueous rosin size dispersion characterized by stability after being frozen.

Rosin size containing a substantial proportion of free rosin dispersed therein presents many advantages over substantially neutral rosin size in the sizing of paper, textiles, and fibrous materials. Such rosin size dispersions are being used commercially to a considerable extent at the present time. The usual method of preparation of these dispersions consists in melting the rosin to be dispersed, causing to react therewith a small fraction of the alkali necessary to bring about complete saponification of the rosin, then dispersing the mixture of rosin and rosin soap in water. Such dispersions have the great disadvantage of being completely broken if the rosin size becomes frozen. Remelting produces an agglomeration of rosin, thereby rendering the size completely unfit for use. Shipping of such rosin size dispersions at below freezing temperatures is, therefore, not possible. As a result, the size dispersion must be prepared in situ at the point of use or must be shipped only in non-freezing weather. Both of these alternatives detract materially from the commercial exploitation of rosin size containing a substantial amount of free rosin.

It is an object of this invention to avoid the above freezing difficulties of aqueous rosin size dispersions containing a substantial proportion of free rosin and to provide such a dispersion which may be shipped in freezing weather without danger of destroying the dispersion.

In accordance with this invention, I have found that an aqueous rosin size dispersion containing a major proportion of free rosin and a minor proportion of rosin soap, prepared with the aid of a protective colloid, may be stabilized against damage by freezing by addition of a small amount of an anti-freeze stabilizing agent, i. e. an agent which not only lowers the freezing point of the size dispersion but also stabilizes it against coagulation upon freezing. Anti-freeze stabilizing agents which I have found to be suitable for this purpose are, for example, dried whey, sugar, corn syrup, glycerol, ethylene glycol, etc. As protective colloids useful in the preparation of the dispersions, such materials as acid or alkaline solutions of casein, egg albumin or soybean protein may be employed. The rosin dispersion may also contain a wax, such as a paraffin wax, as a modifying agent for the rosin.

When rosin is saponified with sufficient alkali to leave less than about 40 per cent of free rosin, the rosin soap formed acts as a dispersing agent for the free rosin and a clear dispersion results. When the amount of free rosin is substantially above 40 per cent, however, the product is not completely soluble in water and forms an emulsion.

In practicing my present invention I saponify rosin by heating the latter to a molten condition, adding an amount of alkali solution, such as sodium hydroxide, potassium hydroxide or sodium carbonate, which is sufficient to saponify less than about 65% of the rosin, preferably about 8 to about 35 per cent of the rosin, carrying out the saponification with efficient mechanical agitation. Then, to the partially saponified rosin I add a protective colloid such as, for example, a casein solution carrying out the dispersion with rapid and efficient agitation so as to produce a dispersion of as small particle size as possible. After dispersion is complete, I add water to dilute to a desirable solids concentration for efficient handling and use, preferably about 50 per cent solids concentration. I add the anti-freeze stabilizing agent to the dispersion along with the water.

The amount of protective colloid necessary to produce suitable dispersions will vary with the particular material used and the amount of saponified rosin present. With a slightly acid solution of casein, for example, the protective colloid may be present in amounts within the range of about one to about 25 per cent by weight based on the weight of rosin.

In testing my anti-freezing aqueous rosin size dispersions against exposure to freezing conditions, I have found it convenient to subject the size in a suitable container to a freezing cycle including exposure to a temperature in the range of about −15° to −23° F. for 16 hours, then allowing to return to room temperature during 8 hours. Referring to this treatment as one cycle, I have established a resistance to 9 such cycles without breaking of the dispersion, or impairing its properties in any way as a sizing agent, as satisfactory and equivalent to the most severe conditions to which rosin size might be exposed during shipment and storage prior to use.

I prefer to use an amount of the anti-freeze stabilizing agent which is sufficient to enable the rosin size dispersion to withstand at least 9 freezing cycles as described above. This amount will vary with different agents. Thus, for example, I find that addition of about 4 per cent of dried whey based on the weight of size, or about 8 per cent of sugar, or about 12 per cent of corn syrup or glycerine is sufficient to produce the desired anti-freezing effect. I find it impossible to establish a definite operable range since the various agents vary somewhat in their effect. A limiting factor in determining the maximum amount of the agent to be added is the cost.

As illustrative of my invention I may cite the following typical examples:

Example I

To 150 parts by weight of I wood rosin heated to about 105° C. and agitated with an efficient stirring device is added 22.5 parts by weight of a 20% solution by weight of sodium hydroxide over a period of about one minute with continuation of agitation for about 5 minutes. With the temperature raised to about 99° C. with added heat, 24 parts by weight of a 12.5 per cent by weight slightly acid aqueous solution of casein are added in about ½ minute and more rapid agitation continued for about 4 minutes to effect the dispersion. Cold water sufficient to give a concentration of about 50 per cent solids is then added together with 12.5 parts by weight of dried whey.

The rosin size dispersion produced in accordance with the above example will withstand at least 10 of the freezing cycles described above without impairing its value as a sizing composition. Paper sized with the above size after 10 freezing cycles became sized to the same extent as paper sized with the unfrozen size.

To accomplish the same result I may substitute for the dried whey of the above example, 26 parts by weight of sugar, 40 parts by weight of corn syrup or 40 parts by weight of glycerol. Although these are the amounts which I have found necessary to give a size to withstand at least 9 of the freezing cycles, I may use a smaller amount in the event that stability to less severe cold atmospheres is desired.

Example II

To 150 parts by weight of G. gum rosin heated to about 105° C. and agitated with an efficient stirring device is added over a period of about one minute a solution of 1.8 parts by weight of sodium hydroxide in 8.5 parts by weight of water. The agitation is continued for about 5 minutes and the temperature raised to about 99° C. Then 24 parts by weight of a 12.5 per cent by weight slightly acid aqueous solution of casein are added and vigorous agitation continued for about 4 minutes to effect the dispersion. Then 12.5 parts by weight of dried whey dissolved in an amount of water sufficient to give 50 per cent by weight solids concentration are added. The rosin size dispersion produced in accordance with the above procedure will withstand at least 10 of the freezing cycles described above and will be satisfactory for shipment without damage under freezing conditions.

The rosin size dispersions containing dried whey are sometimes subject to putrefaction. A preservative may be included to prevent such putrefaction of the dried whey.

In the example of rosin size illustrated in Example I above, the alkali employed is sufficient to saponify approximately 25 per cent of the rosin, thus leaving about 75 per cent of the rosin as the free acid in the size. In Example II the amount of free rosin is about 90 per cent. I may vary the amount of caustic added from the amount necessary to saponify about 8 per cent up to the amount necessary to saponify about 35 per cent of the rosin.

The invention is equally operable with dispersions prepared from wood or gum rosin. All the various grades of these rosins or the acids derived from them, such as abietic acid, etc. may be used.

The anti-freezing stabilized dispersions prepared in accordance with this invention may be used for sizing fibrous materials, such as paper, board, textiles, etc.

It will be understood that the details and examples hereinbefore set forth are illustrative only, and that the invention as broadly described and claimed is in no way limited thereby.

What I claim and desire to protect by Letters Patent is:

1. An aqueous sizing dispersion comprising a rosin size consisting of from about 65 to about 92 per cent by weight of free rosin and from about 8 to about 35 per cent by weight of rosin soap, a protective colloid, and an agent selected from the group consisting of dried whey, sugar, corn syrup, glycerol, and ethylene glycol, said agent being employed in an amount sufficient to render the dispersion stable to coagulation upon repeated freezing at temperatures in the range of −15° to −23° F. for 16 hours.

2. An aqueous sizing dispersion comprising a rosin size consisting of from about 65 to about 92 per cent by weight of free rosin and from about 8 to about 35 per cent by weight of rosin soap, a protective colloid, and an amount of dried whey sufficient to render the dispersion stable to coagulation upon repeated freezing at temperatures in the range of −15° to −23° F. for 16 hours.

3. An aqueous sizing dispersion comprising a rosin size consisting of from about 65 to about 92 per cent by weight of free rosin and from about 8 to about 35 per cent by weight of rosin soap, a protective colloid, and an amount of sugar sufficient to render the dispersion stable to coagulation upon repeated freezing at temperatures in the range of −15° to −23° F. for 16 hours.

4. An aqueous sizing dispersion comprising a rosin size consisting of from about 65 to about 92 per cent by weight of free rosin and from about 8 to about 35 per cent by weight of rosin soap, a protective colloid, and an amount of corn syrup sufficient to render the dispersion stable to coagulation upon repeated freezing at temperatures in the range of −15° to −23° F. for 16 hours.

5. An aqueous sizing dispersion comprising a rosin size consisting of from about 65 to about 92 per cent by weight of free rosin and from about 8 to about 35 per cent by weight of rosin soap, between about 1 and about 25 per cent of a protective colloid based on the weight of rosin, about 4 per cent of dried whey based on the total weight of the dispersion, said dispersion being stable to coagulation upon repeated freezing at temperatures in the range of −15° to −23° F. for 16 hours.

6. An aqueous sizing dispersion containing approximately 50 per cent by weight of solids and comprising a rosin size consisting of from about 65 to about 92 per cent by weight of free rosin and from about 8 to about 35 per cent by weight of rosin soap, between about 1 and about 25 per cent of casein based on the weight of the rosin, and about 4 per cent of dried whey based on the total weight of the dispersion, said dispersion being stable to coagulation upon repeated freezing at temperatures in the range of −15° to −23° F. for 16 hours.

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