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CELLULOSE PRODUCT

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My invention relates to improvements in the manufacture of cellulose products and relates more particularly to absorbent cellulose products, such as towels, napkins, diapers, and the like.

It has been found in practice that it is undesirable for absorbent cellulosic sheets to possess too high an absorbency, because, if such is the case, the sheet disintegrates too quickly when moistened. Thus, in the case of highly absorbent toweling, it is found that the sheet pulls apart in the hands when used for drying. It has accordingly been the contemplated practice to strengthen the cellulosic sheets by sizing such material so as to reduce the absorbency and to produce, in effect, a greater temporary wet strength. The usual rosin-alum size may be used for this purpose.

It has been found, however, that the presence of the size greatly accelerates the natural aging of the cellulose sheet and invariably involves an excessive loss of absorbency. The size also frequently hardens the sheet and decreases its softness.

It is an object of my invention to produce an absorbent cellulose product having a satisfactory temporary wet strength that will retain its absorbency.

It is also an object of my invention to produce an absorbent sized cellulose product that will not age-harden.

Other objects will be apparent as the description hereinafter proceeds.

I have discovered a method of controlling absorbency, i. e. decreasing the hardening and loss of absorbency of sized cellulose products caused by aging, which comprises incorporating phospholipoid with the cellulose fibers. The phospholipoids found to be particularly adapted for use in my invention are the soya bean oil phospholipoids containing a substantial proportion of lecithin.

In accordance with my invention, the cellulosic sheet is sized with a composition which will increase the temporary wet strength, and then treated with a phospholipoid which will eliminate or substantially reduce the aging and hardening effects above referred to, so that the sheet will maintain its high absorbency and softness in spite of natural aging or accelerated aging. My invention may be practiced by introducing into the pulp an emulsion containing a phospholipoid such as lecithin, cephalin and the like, or mixtures of the same.

In accordance with my invention the phospholipoid may either be introduced into the fur-

nish, for example, in the beater, or it may be applied to a formed sheet.

In a preferred embodiment of my invention I use an oil emulsion prepared as follows:

One part by weight of an oil solution or dispersion containing about 60 percent lecithin is placed in a vessel with ten parts by weight of water and warmed to approximately 80° C. It is then emulsified by vigorous agitation; but to accelerate such emulsification, a small proportion of an agent like triethanolamine is usually incorporated. No more than 1 percent of such an emulsifying agent based on the weight of the lecithin is required. After the emulsion has been formed, it may be diluted to any consistency desired by adding warm water, preferably around 70° C.

Approximately $\frac{1}{3}$ of one percent of the lecithin in the form of an emulsion as described above, based on the weight of dry fiber, is introduced into the stock, preferably in the beater, and the paper-making process is otherwise conducted in the usual manner. Higher percentages of the phospholipoid emulsion may be employed although the percentage usually employed is below 2 percent.

If desired, the cellulose fibers may be sized, for example, by addition of one or two percent of rosin and alum in the usual manner, which brings the pH down to about 5.5. It is found that the phospholipoids are particularly effective in reducing the aging effect of a size such as rosin-alum and in increasing the softness of the paper sheet.

The phospholipoid emulsion may also, if desired, be applied to the wet web of paper as by spraying or by other suitable means, and the paper dried and finished in the usual way.

The phospholipoids preferably employed are obtained, as is well known by those skilled in the art, by solvent extraction of the soya bean. The complex mixture includes lecithin, cephalin and the like and contains a considerable proportion of oil, possibly 40 percent by weight or more depending upon the degree of purification, extraction, etc. The percentage of phospholipoids used will vary with the different type size materials used and will also vary proportionally to the percentage of phospholipoids in the oil extraction. The optimum amount of phospholipoid to be used for different type sized fibers can readily be determined by experimental tests.

The soya bean oil phospholipoids may also be obtained in concentrated form by pumping the soya bean oil into steam jacketed tanks provided with stirrers and suitable heating devices. The

oil in the tanks is then emulsified by means of water and steam, care being taken not to exceed a temperature of 40° C. As a result of this treatment the complex containing a high percentage of phospholipoids separates out as a solid phase in the water. The material is then centrifuged and the solid material, which is a viscous mass, dried to remove the last traces of water. This phospholipoid complex containing a substantial portion of lecithin may be re-dispersed in mineral or vegetable oil at the desired concentration and used as described above.

Various modifications and variations of my invention may suggest themselves to those skilled in the art. Hence, I do not wish to be limited to the specific embodiments disclosed herein, but intend that the scope of my invention be determined from the appended claims, which are to be interpreted as broadly as the state of the art will permit.

I claim:

1. An absorbent paper product of the group consisting of towels, napkins, and diapers, comprising essentially rosin-alum sized cellulose fibers having incorporated therewith an oil emulsion of a phospholipoid, said phospholipoid being present in amounts between approximately $\frac{1}{10}$ of one

per cent and 2 per cent based on the weight of the dry fiber, said product being substantially free for hardening and loss of absorbency caused by aging of said sized cellulose fibers.

2. An absorbent paper product of the group consisting of towels, napkins, and diapers, comprising essentially rosin-alum sized cellulose fibers having incorporated therewith an oil emulsion of a soya bean oil phospholipoid, said phospholipoid being present in amounts between approximately $\frac{1}{10}$ of one per cent and 2 per cent based on the weight of the dry fiber, said product being substantially free from hardening and loss of absorbency caused by aging of said sized cellulose fibers.

3. An absorbent paper product of the group consisting of towels, napkins, and diapers, comprising essentially rosin-alum sized cellulose fibers having incorporated therewith an oil emulsion of a lecithin phospholipoid, said phospholipoid being present in amounts between approximately $\frac{1}{10}$ of one per cent and 2 per cent based on the weight of the dry fiber, said product being substantially free from hardening and loss of absorbency caused by aging of said sized cellulose fibers.

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