

UNITED STATES PATENT OFFICE

2,432,128

METHOD OF IMPROVING THE PROCESSING
OF REFINED CHEMICAL PULP INTO VIS-
COSE

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No Drawing. Application October 16, 1943,
Serial No. 506,586

16 Claims. (Cl. 260—217)

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This invention relates to the production of cellulose products, and has for its general object the provision of certain improvements in carrying out one or more of the processing steps in the production of such products. The invention is of special advantage in the preparation and processing of viscose derived from chemically prepared wood pulp, and in this connection aims to improve the steps of shredding and filtering. The invention provides a method of processing chemical wood pulp comprising the incorporation in the pulp prior to the completion of shredding, of a hydroxy-alkyl amide dispersible in water or caustic soda solutions and wherein one of the groups attached to the nitrogen is an aliphatic acyl radical with from 7-18 carbon atoms. The invention also provides, as a new article of manufacture, a chemically prepared wood pulp product having incorporated therein a hydroxy-alkylamide dispersible in water or caustic soda solutions and wherein one of the groups attached to the nitrogen is an aliphatic acyl radical with from 7-18 carbon atoms.

Chemically prepared wood pulps are extensively used in the industrial arts for the production of such cellulose products as rayon and other synthetic fibers, nitrocellulose, cellulose acetate, cellulose ethers, Cellophane and similar cellulose films or sheets, etc. Wood pulp is commonly prepared and marketed in sheet form, and comminution or shredding is customarily one of the initial steps in its subsequent processing. When wood pulp is used in bulk form, either wet or dry, shredding or comminution is frequently a step involved in the subsequent processing. Since such subsequent processing usually involves the conversion of the cellulose of the wood pulp to some cellulose derivative and the solution of the derivative in a suitable solvent, the purpose of shredding is to break down the sheet into a fluffy mass or crumb in which the individual fibers will be suitably exposed to the action of the derivative-forming reagent or reagents. Thus, for example, in the production of viscose, the wood pulp sheet is customarily steeped in a caustic soda solution to form alkali cellulose, and the alkali cellulose, after pressing and while still in sheet form, is shredded or comminuted to properly prepare the cellulose fibers for the xanthating reaction with carbon bisulfide. The resulting sodium cellulose xanthate is dissolved in dilute caustic soda to form the solution commonly known as viscose, which is opacified if desired, filtered, and spun into filaments.

Normal dissolving wood pulps in present use

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consist mainly of cellulose, but contain appreciable amounts of non-cellulosic impurities, such as hemi-celluloses, fats, resins, waxes, etc. One of the main objects in the manufacture of a highly refined dissolving pulp is to remove as much as possible of the noncellulosic impurities, so that a whiter, purer pulp results, which is capable, in the manufacture of rayon, of producing a higher grade yarn.

We find, however, that not all of the noncellulosic impurities which can be removed are undesirable, and in fact, certain of such impurities, normally present in small amounts, are highly beneficial in aiding the processing of the pulp into viscose especially as regards the step of shredding the alkali cellulose. The beneficial impurities which aid the shredding operation are probably of the nature of fiber lubricants which permit the steeped and pressed pulp to be thoroughly shredded into a fluffy condition more readily and without mechanical damage to the alkali cellulose fibers, which would cause them to react incompletely with carbon bisulfide. In a pulp which has not been highly refined, most of these beneficial impurities constitute a portion of the materials removable by organic solvents, as for example, ether, benzene, alcohol, etc. These beneficial impurities, often loosely termed "resins," are mainly of the nature of waxes, fats and resins, the latter often being present in a relatively small amount.

In theory, the problem of making a good pulp could be solved by removing all the undesirable impurities while retaining those impurities which facilitate the shredding operation by lubricating the fibers or otherwise. In practice, such a clean-cut separation is difficult to accomplish directly. We have discovered that better results are obtainable by removing most or all of the impurities, including those which serve beneficially as lubricants to the alkali cellulose fibers during shredding, and then adding to the pulp or to the alkali cellulose prior to the completion of shredding a sufficient amount of a material of a class entirely different from the natural impurities originally present, and which greatly aids the steps of shredding and filtering.

White, highly purified or refined wood pulps are very advantageous for the production of high grade rayon yarns of superior strength and color, and for this reason, are highly esteemed by the trade. Such highly refined pulps are in general characterized by having an ether extract of about 0.15% or less where such values refer to the amount of natural ether-extractable material

left in the pulp after the purification processes. While our invention is particularly applicable to such highly refined pulps containing not more than about 0.15% of ether-extractable material, and increasingly so as the ether extract approaches zero, it may be applied with certain advantages to the processing of normal dissolving pulps containing substantially more than 0.15% of ether-extractable material, although such pulps do not generally yield the highest grade yarns and their processing into shredded alkali cellulose is not accompanied by any particular difficulty.

The surface-active portion of the beneficial impurities, naturally present as such in the refined pulps or formed during the processing, are predominately of the general class known as anion-active materials.

We have discovered that a purely synthetic class of materials gives important results in the processing of chemical pulps. In general, the compounds which we have discovered for use in our invention are much more effective than the beneficial portion of the impurities naturally present. Accordingly, these compounds can be used in very minute quantities. This is doubly advantageous, because such additions of materials are inexpensive and also because the very pure pulp treated with the compounds is substantially free from noncellulosic materials due to the minuteness of the quantity of the compounds required. Based on these discoveries, our invention involves improving one or more of the processing steps in the production of cellulosic products from chemically prepared wood pulp by carrying out one or more of the processing steps in the presence of one (or more) of the said hydroxyalkyl amides. When applied to the preparation and processing of viscose derived from chemically prepared wood pulp, the invention particularly involves carrying out the shredding of the alkali cellulose, or at least the final stage of shredding, and the filtration of the viscose in the presence of one (or more) of the said hydroxyalkyl amides.

The hydroxy alkyl amides of the invention may be represented as



in which



is the acyl radical of an organic acid containing 7-18 carbon atoms. R_1 is thus an aliphatic hydrocarbon radical either straight or branched chain, saturated or unsaturated. R_2 is the radical derived from a hydroxy alkyl amine (primary or secondary) derived by loss of one hydrogen from the amino group. It will contain at least one hydroxyl group and generally have a considerably smaller number of carbon atoms than the group



In the hydroxy alkyl amides of the invention the effects of the lipophilic group R_1 and the effect of the hydrophilic groups, which include the hydroxyl groups, are so balanced that the compounds are either difficultly or readily dispersible in water. In the most preferred cases the compounds are readily dispersible in water.

Among the most readily available sources of the long chain lipophilic acyl groups are the vegetable and animal fats and oils. These are

mostly divided into two types, those in which the predominating fatty acids are lauric acid (C_{12}) and those in which the predominating fatty acids are C_{16} and C_{18} acids, saturated and unsaturated. In the most preferred application of the invention we use hydroxy alkyl amides derived from lauric acid or from mixtures of fatty acids predominating in lauric acid since such compounds are in general much more easily water dispersible than the products from the common higher molecular weight acids. Actually we find that lauric acid in technical coconut fatty acid mixtures is preferable to pure lauric acid—possibly due to the presence of small amounts of fatty acids having eight and ten carbon atoms.

When using the readily available higher molecular weight fatty acids (C_{16} , C_{18}) or mixtures of fatty acids predominating in them, for the same reasons we prefer to use products containing predominantly oleic acid rather than using products containing predominantly stearic or palmitic acid or mixtures of both. Furthermore when using these fatty acids higher than C_{12} we prefer to use hydroxyalkyl amines containing at least two hydroxyl groups. Hydroxyalkyl amides of monoethanolamine and fatty acids of 16 and 18 carbon atoms are in general only dispersible in the presence of appreciable amounts of added water-soluble emulsifying agents.

The hydroxy alkyl amides of the invention will be usually prepared by reacting hydroxy alkyl amines with fatty acids, fatty esters (methyl, ethyl, glycerine esters, etc.) or fatty acyl halides in substantially similar ways to well-known procedures for preparing amides.

Since the compounds of the invention are applied in the form of dispersions, when applying those agents that are difficultly dispersible (by themselves) in water it will frequently be found advantageous to disperse them in the presence of small amounts of water-soluble emulsifying agents. Many of the compounds of the invention, as explained in more detail later, will almost invariably contain as impurities appreciable amounts of amino esters. These, in the presence of small amounts of acids, are capable of acting as effective emulsifying agents. Accordingly, with many of the compounds which are by themselves difficultly dispersible in water, it is not necessary to actually add an emulsifying agent but merely to add small amounts of an acid (preferably acetic acid) to convert the amino groups in the amino esters partly or wholly into salt form.

Hydroxyalkyl amines suitable for preparing the hydroxyl alkyl amides of the invention include: monoethanolamine, diethanolamine, tris (hydroxymethyl) aminomethane, 2-amino-2-methyl-1,3-propanediol, and 2-amino-2-ethyl-1,3-propanediol. In the preferred forms of the invention the hydroxyalkyl amines used in preparing the hydroxyalkyl amides will have from 2-5 carbon atoms, from 1-3 hydroxyl groups and a ratio of hydroxyl to carbon atoms of at least 0.4.

Almost invariably the hydroxy alkyl amide reaction products will contain as impurities appreciable amounts of amino esters formed by acylation of hydroxyl groups instead of the amino group. Where feasible, we prefer to keep the contamination of by-product amino esters to a low percentage since these compounds will saponify during the steeping step when the products are used in the viscose process. The presence of substantial amounts of amino esters will, however, be unavoidable in many cases—particularly when the compounds are prepared from the

more complicated hydroxyalkyl amine i. e., those other than monoethanolamine and diethanolamine. Such compounds containing amino esters may nevertheless be used very satisfactorily for the purposes of the invention.

As has been stated previously, the amino esters present may in salt form act as emulsifying agents, which render the products more dispersible in water and thus more readily applied to the pulp or to the alkali cellulose. Thus with hydroxyalkyl amides prepared from the more complicated hydroxyalkyl amines (i. e., those other than monoethanolamine or diethanolamine) we frequently add small amounts of acetic acid when preparing the dispersion. Alternately the addition of acetic acid may be made during the manufacture of the agents, when the final reaction mixture has partly cooled. Usually with hydroxyalkyl amides prepared from monoethanolamine and diethanolamine to addition of acetic acid is not appreciably effective in aiding the dispersion in water. Where readily dispersible, such products may be dispersed in water simply by mechanical action. Otherwise additional emulsifying agents may be added.

In general we find that the emulsions are more readily prepared and are more stable in hot water. Accordingly where practical we prefer to prepare, store and apply the emulsions while hot. In some cases when storing the emulsions in a stock tank a certain amount of continuous agitation will be found advantageous.

Where the agents are to be sprayed into the alkali cellulose during shredding, in order not to unduly wet the fibers, we prefer to use either a concentrated emulsion in water or a concentrated solution in a suitable volatile, water-miscible solvent such as ethyl alcohol or isopropyl alcohol.

When used in the concentrations of the invention the agents, due either to their final low concentration or to the effect of the various processing steps through which they pass, become completely dispersed or dissolved in the final viscose solution.

Among the compounds which we have successfully used in the practice of our invention are products which are predominantly or contain in substantial amounts the following: the amides formed from the acids derived from coconut oil and monoethanolamine, diethanolamine, 2-amino-2-methyl-1, 3-propanediol, and tris (hydroxymethyl) aminomethane; the amide formed from lauric acid and monoethanolamine; the amides formed from stearic acid and diethanolamine, 2-amino-2-methyl-1, 3-propanediol, and tris (hydroxymethyl) aminomethane; and the amides formed from oleic acid and diethanolamine, 2-amino-2-methyl-1,3-propanediol, and tris (hydroxymethyl) aminomethane. Having regard to their effectiveness and ease and economy of preparation, the three most preferred products are the amide formed from the acids derived from coconut oil and monoethanolamine, the similar amide from diethanolamine, and the amide formed from oleic acid and diethanolamine.

While highly refined wood pulps are advantageous for the production of high grade rayon yarns of superior strength and color, the reaction of the shredded alkali cellulose from such pulps with carbon bisulfide is frequently incomplete. This impairment in the xanthating activity of the shredded alkali cellulose is due to some damage to the fibers during the shredding

operation or to incomplete comminution or to formation of compressed fiber bundles. In the case of the conventional shredder having revolving blades coacting with a stationary saddle bar, the tendency for such damage is especially great if the clearance between the revolving blades and the saddle bar is a little less than the correct value. In an extreme case, with a very highly refined pulp, shredding even under optimum conditions, may produce a shredded pulp which xanthates less completely than if the alkali cellulose were not shredded at all. In other cases, it is possible to obtain reasonably satisfactory shredding of the alkali cellulose from highly refined pulps by adjusting the shredder clearance and by experimenting to find the optimum shredding time for the particular pulp and particular shredder. In this manner it is possible in some cases to obtain almost as complete a degree of xanthation of the shredded alkali cellulose from a highly refined pulp as would be obtained with the shredded alkali cellulose from a less pure pulp. But the necessity of constant supervision and adjustment to assure optimum shredding conditions makes the shredding of highly refined pulps too sensitive for satisfactory commercial practice. This sensitivity to damage during shredding of the alkali cellulose from highly refined pulps is overcome, in our invention, by carrying out the shredding operation in the presence of one of the hydroxyalkyl amides, which may be added to the pulp prior to shredding or to the alkali cellulose prior to the completion of shredding. The improvement in shredding produces a shredded alkali cellulose which reacts substantially completely with carbon bisulfide, and the resulting viscose is comparatively free of unreacted fibers and filtration proceeds more rapidly and economically.

In the usual viscose process the sheets are first subjected to a steeping step to convert the cellulose to alkali cellulose, and the pressed sheets of alkali cellulose are then shredded to form a fluffy mass of fibers. The fluffy mass is xanthated, dissolved in dilute caustic soda and the solution commonly known as viscose filtered to remove undissolved fibers and gel-like materials, and ripened to impart the desired properties for satisfactory spinning.

The most practical and economical manner of securing the desired presence of a hydroxyalkyl amide of our invention during the shredding of the alkali cellulose and during the filtration of the viscose is to incorporate the hydroxyalkyl amide in the wood pulp. This may be advantageously effected by adding the hydroxyalkyl amide to the pulp on the sheet-forming machine subsequent to sheet formation but prior to complete drying, by spraying the pulp sheet with an aqueous emulsion or dispersion of the compound or by means of a rotating roll partly immersed in such an emulsion or dispersion. If desired, the hydroxyalkyl amide compounds of the invention may be incorporated in the pulp prior to sheet formation, as, for example, by adding the agent in dispersion or emulsion form to a suspension of pulp in water in a stock chest. In the latter case, usually the white water need not be re-circulated in order to prevent considerable loss of the agent when eliminating water in sheet formation, since nearly all of the agent will be adsorbed by the cellulose. In any case, there is produced a chemically prepared wood pulp product having a hydroxyalkyl amide compound incorporated therein. When the hydroxyalkyl

amide compound is so incorporated in the wood pulp by the manufacturer thereof, the pulp comes to the rayon manufacturer in a form calculated to secure the full advantages of the invention in the preparation and processing of the viscose into high grade rayon yarns.

The amount of the hydroxyalkyl amide compounds used in the practice of the invention is relatively small, ranging from 0.01 to 0.20%, and preferably from 0.02 to 0.10%, by weight on the bone dry weight of the wood pulp used, when the agent is incorporated in or added to the pulp or to the alkali cellulose. So far as the objectives of the invention are concerned, there is little if any improvement by increasing the amount of hydroxyalkyl amide above 0.20% and such higher amounts frequently give rise to certain disadvantages. These disadvantages include the causing of excessive softness in the sheet, resulting in mechanical difficulties in steeping, excessive ball formation in xanthation, difficulties in the dissolving operation due both to the excessive ball formation in the xanthating step and due to excessive foaming in the viscose solution. Also, there may be considerable difficulty in obtaining a completely de-aerated viscose which is absolutely necessary for satisfactory spinning. Higher concentrations of the hydroxyalkyl amides also tend to change the coagulating conditions so that the viscose cannot be satisfactorily spun by standard methods. Higher concentrations of the hydroxyalkyl amides also cause excessive turbidity of the viscose and may even cause poor filtration by separation of the amide from the viscose. Also, in the event of using unduly high proportions of the hydroxyalkyl amides the final regenerated cellulose product will tend to be "delustered" and of lower strength.

While it is our preferred practice to incorporate the hydroxyalkyl amide in the wood pulp, preferably a highly refined pulp containing not more than about 0.15% of ether extractable material, the presence of the compound during the processing steps of shredding may be secured in any other appropriate manner. Moreover, when the pulp is in sheet form, the compound need not be incorporated in every sheet, but may be incorporated in only alternate sheets. It may be added to only a portion of the pulp in whatever form it is marketed. Alternatively, the compound may be sprayed upon or otherwise suitably added to all or a portion of the alkali cellulose prior to shredding or prior to the completion of shredding. However, we believe it will generally be found more advantageous to incorporate the hydroxyalkyl amide in the initial wood pulp product, both as a matter of convenience and economy in preparing and processing the viscose, and because a very uniform distribution of the compound throughout the viscose is easily attained.

When the invention is practiced for effecting the hereinbefore-mentioned improvements in shredding, certain further economies are effected in the subsequent steps of xanthating, dissolving and filtering. In viscose solutions there is usually a certain amount of undissolved fibers and gel-like material due to the incomplete reaction of the cellulose with the carbon bisulfide during xanthation. Prior to spinning, the viscose solutions are filtered several times to remove these gels and undissolved fibers. In the event that the viscose solutions contain excessive amounts of undissolved and partially dissolved fibers, filtration is an expensive operation. In such cases

the filters become rapidly clogged and the filter media must be changed frequently in order that the viscose will pass through in a reasonable time. Frequent changing of the filter media is expensive, not only as regards consumption of filter cloth but also in view of the very considerable amount of labor involved and also since a certain amount of viscose is lost every time the filter is opened up. Furthermore, when the viscose solutions contain very large proportions of gel-like material, filtration is usually not altogether satisfactory in that some of the smaller gel-like particles tend to pass through the pores of the cloth with adverse effect upon the spinning operation. It has heretofore been the practice in the viscose industry, when processing pulps which tend to yield viscose solutions high in undissolved material and having poor filtration properties, to minimize such difficulties by carrying out the xanthation with amounts of carbon bisulfide considerably in excess of that normally required. Use of excess carbon bisulfide is expensive and in addition is technically undesirable in that it may adversely affect certain properties such as the ripening of the viscose and yarn characteristics. We have found that when processing highly purified pulps which would normally tend to give poorly filtering viscose solutions, the addition of minute amounts of the hydroxyalkyl amide compounds of the invention so improves the shredding operation that the alkali cellulose subsequently reacts much more completely with carbon bisulfide and yields a viscose solution very free from undissolved and partially dissolved cellulose particles and having good filtration properties. This result can be accomplished not only without the use of excess carbon bisulfide, but in many cases satisfactory viscose solutions can be obtained using amounts of carbon bisulfide very substantially less than the amounts normally required.

We claim:

1. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to one of the viscose forming materials at a stage prior to completion of shredding a hydroxyalkyl amide dispersible in water and wherein one of the groups attached to the nitrogen is an aliphatic acyl radical with from 7-18 carbon atoms, said amide being added in a range from 0.01% to 0.20% by weight, such percentages being based on the weight of the bone dry pulp.

2. The method of improving the manufacture of shredded alkali cellulose from refined chemical pulp containing not more than 0.15% ether-extractable matter comprising adding to one of the alkali cellulose forming materials at a stage prior to the completion of shredding a hydroxyalkyl amide dispersible in water and wherein one of the groups attached to the nitrogen is an aliphatic acyl radical with from 7-18 carbon atoms, said amide being added in a range from 0.01% to 0.20%, such percentages being based on the weight of the bone dry pulp.

3. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to such refined chemical pulp prior to use in the viscose process a hydroxyalkyl amide dispersible in water and wherein one of the groups attached to the nitrogen is an aliphatic acyl radical with from 7-18 carbon atoms, said amide being added in a range from 0.01% to 0.20% by

weight, such percentages being based on the bone dry weight of the pulp.

4. As a new article of manufacture, a refined chemical pulp product containing not more than 0.15% of natural ether-extractable matter and having incorporated therein a hydroxyalkyl amide dispersible in water and wherein one of the groups attached to the nitrogen is an aliphatic acyl radical with from 7-18 carbon atoms, the amount of the incorporated amide being from 0.01% to 0.20% by weight, such percentages being based on the bone dry weight of the pulp.

5. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to one of the viscose forming materials at a stage prior to completion of shredding a condensation product dispersible in water, formed from a fatty acid having from 7-18 carbon atoms, and a hydroxyalkyl amine having from 2 to 5 carbon atoms, from 1 to 3 hydroxyl groups and a ratio of hydroxyl groups to carbon atoms of at least 0.4, said condensation product being at least in part a hydroxyalkyl amide and being added in a range from 0.01% to 0.20% by weight, such percentages being based on the weight of the bone dry pulp.

6. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to such refined chemical pulp prior to use in the viscose process a condensation product dispersible in water, formed from a fatty acid having from 7-18 carbon atoms, and a hydroxyalkyl amine having from 2 to 5 carbon atoms, from 1 to 3 hydroxyl groups and a ratio of hydroxyl groups to carbon atoms of at least 0.4, said condensation product being at least in part a hydroxyalkyl amide and being added in a range from 0.01% to 0.20% by weight, such percentages being based on the bone dry weight of the pulp.

7. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to one of the viscose forming materials at a stage prior to completion of shredding a condensation product dispersible in water, formed from fatty acids of vegetable origin predominating in lauric acid, and a hydroxyalkyl amine having from 2 to 5 carbon atoms, from 1 to 3 hydroxyl groups and a ratio of hydroxyl groups to carbon atoms of at least 0.4, said condensation product being at least in part a hydroxyalkyl amide and being added in a range from 0.01% to 0.20% by weight, such percentages being based on the weight of the bone dry pulp.

8. The method of improving the manufacture of shredded alkali cellulose from refined chemical pulp containing not more than 0.15% ether-extractable matter comprising adding to one of the alkali cellulose forming materials at a stage prior to the completion of shredding a condensation product dispersible in water, formed from fatty acids of vegetable origin predominating in lauric acid, and a hydroxyalkyl amine having from 2 to 5 carbon atoms, from 1 to 3 hydroxyl groups and a ratio of hydroxyl groups to carbon atoms of at least 0.4, said condensation product being at least in part a hydroxyalkyl amide and being added in a range from 0.01% to 0.20%, such percentages being based on the weight of the bone dry pulp.

9. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to such refined chemical pulp prior

to use in the viscose process a condensation product dispersible in water, formed from fatty acids of vegetable origin predominating in lauric acid, and a hydroxyalkyl amine having from 2 to 5 carbon atoms, from 1 to 3 hydroxyl groups and a ratio of hydroxyl groups to carbon atoms of at least 0.4, said condensation product being at least in part a hydroxyalkyl amide and being added in a range from 0.01% to 0.20% by weight, such percentages being based on the bone dry weight of the pulp.

10. As a new article of manufacture, a refined chemical pulp product containing not more than 0.15% of natural ether-extractable matter and having incorporated therein a condensation product dispersible in water, formed from fatty acids of vegetable origin predominating in lauric acid, and a hydroxyalkyl amine having from 2 to 5 carbon atoms, from 1 to 3 hydroxyl groups and a ratio of hydroxyl groups to carbon atoms of at least 0.4, said condensation product being at least in part a hydroxyalkyl amide; the amount of the incorporated condensation product being from 0.01% to 0.20% by weight, such percentages being based on the bone dry weight of the pulp.

11. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to one of the viscose forming materials at a stage prior to completion of shredding a hydroxyalkyl amide of the fatty acids derived from coconut oil and predominating in lauric acid, and diethanolamine; said amide being added in a range from 0.01% to 0.20% by weight, such percentages being based on the weight of the bone dry pulp.

12. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to such refined chemical pulp prior to use in the viscose process a hydroxyalkyl amide of the fatty acids derived from coconut oil and predominating in lauric acid, and diethanolamine; said amide being added in a range from 0.01% to 0.20% by weight, such percentages being based on the bone dry weight of the pulp.

13. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to one of the viscose forming materials at a stage prior to completion of shredding a hydroxyalkyl amide of the fatty acids derived from coconut oil and predominating in lauric acid, and monoethanolamine; said amide being added in a range from 0.01% to 0.20% by weight, such percentages being based on the weight of the bone dry pulp.

14. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to such refined chemical pulp prior to use in the viscose process a hydroxyalkyl amide of the fatty acids derived from coconut oil and predominating in lauric acid, and monoethanolamine; said amide being added in a range from 0.01% to 0.20% by weight, such percentages being based on the bone dry weight of the pulp.

15. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to one of the viscose forming materials at a stage prior to completion of shredding a hydroxyalkyl amide of oleic acid and

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diethanolamine, said amide being added in a range from 0.01% to 0.20% by weight, such percentages being based on the weight of the bone dry pulp.

16. The method of improving the processing of refined chemical pulp containing not more than 0.15% ether-extractable matter into viscose comprising adding to such refined chemical pulp prior to use in the viscose process a hydroxyalkyl amide of oleic acid and diethanolamine, said amide being added in a range from 0.01% to 0.20% by weight, such percentages being based on the bone dry weight of the pulp.

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