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BLEACHING OF PAPER PULP

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This invention relates to the bleaching of fiber pulp to render it suitable for paper manufacture.

More specifically the improvement relates to a particular two phase procedure for carrying out a bleaching action in accordance with which first an acid treatment and secondly an alkaline action is provided.

In the bleaching of paper pulps made from wood which require relatively severe bleaching treatments it is difficult to obtain pulps of maximum strength by ordinary bleaching processes. Especialy is it true when the pulps are produced from various species of resinous woods such as the various species of pine, Douglas fir, etc., woods high in extractive matter such as redwood, cedar, chestnut, oak, etc., or woods similar in structure to the gums, birches, maples, etc., by the use of alkaline methods of pulping such as the soda or sulphate processes. The bleached pulps obtained generally have a yellow shade which limits their use to a considerable extent. This yellow cast has been found to be caused by coloring substances of the nature of dyestuff, polyphenolic in character. Their calcium and iron salts are insoluble in water, are deeply colored and cannot be removed from the pulp by the methods ordinarily used.

Efforts have heretofore been made to produce desirable bleached pulp and various treatments have been recommended. The use of the two stages of treatment has been tried and in one of these the use of calcium hypochlorite has been advocated. Also the use of chlorine water has been tried, and controlled alkalinity has been credited with the production of good results. It has now been determined that by giving the pulps a series of chemical treatments in which occur first an acid treatment with chlorine water or hypochlorous acid and subsequently an alkaline treatment with calcium hypochlorite or a hypochlorite of an alkaline earth or metal a strong white pulp is obtained meeting the requirements of the trade. It is necessary to control the alkalinity throughout the final portion of the bleaching treatment, however, so that the alkalinity is evident by the use of pnenolphthalein indicator and this can be done by the addition of caustic soda or potash in small amounts as the treatment proceeds.

In carrying out the process the thoroughly washed unbleached pulp is treated with chlorine water for about two hours. The chlorine water may be produced separately by the solution of chlorine gas in cold water in an absorbtion tower or suitable asperator arrangement or the gas may be added to the pulp in slush form by feeding it into the suction pipe of a centrifugal pump through which slush pulp is being pumped to tanks for holding the pulp until the chlorine has had time to act, usually less than two hours. When chlorine gas is added to the pulp directly it should be added at such a rate so as to uniformly distribute the gas throughout the slush stock at the proportion desired, usually about 100 pounds of chlorine to one ton (dry weight) of fiber. Either an automatic or hand regulated chlorinator such as is used in the treatment of water in public water works is suitable for the purpose.

After the active chlorine has combined with the impurities in the pulp the latter is washed by means of vacuum filter or multiple decker cylinder washers or similar devices. It is then treated with alkaline hypochlorite bleach liquor and thoroughly mixed in suitable bleaching equipment known to the art. While the treatment proceeds the alkalinity as shown by phenolphthalein indicator grows less and would disappear unless caustic alkaline solution was added from time to time so that an alkaline condition exists until the desired degree of bleaching is obtained and the active chlorine is almost exhausted. The pulp is then thoroughly washed and is then ready for use or in subsequent manufacturing operations.

An example of treatment would be that accorded to sulphate pulp from loblolly pine. The pulp used need not be cooked soft as is customary for so called "easy bleaching" pulp. A medium hard pulp obtained with a yield of about 42% of the dry weight of the wood is taken in slush form after thorough washing. The consistency may be about

three percent. It is pumped through a centrifugal pump while into the inlet passes a stream of chlorine gas fed at such a rate that 100 pounds of chlorine are added to one ton (dry weight) of pulp. The ratio of chlorine to water may be as high as eight grams of chlorine per liter and as low as 0.5 gram per liter. The pulp passes to a chest provided with a mixing agitator so that it is thoroughly mixed while the chemical action is in progress. It is then washed. The washed pulp is raised in consistency to from 6% to 18% depending on the type of bleaching equipment available. As it is added to the bleachers it is mixed with alkaline hypochlorite solution in the ratio of about 25% standard hypochlorite (35% available chlorine) to the dry weight of the pulp. After the bleacher is filled and the mixing has proceeded for fifteen minutes or so the alkalinity will have become nearly exhausted and caustic soda solution is added, a little at a time, so that in the course of approximately five hours the amount of caustic soda added will amount to about 1.5% of the weight of the pulp. A temperature above 100° F. should not be exceeded. The active chlorine in this time has been exhausted to the extent that it is safe to go and the contents of the bleacher are dumped and thoroughly washed. A bright white pulp results with maximum strength and suitable for meeting the most exacting requirements.

From the foregoing it will be obvious that the present invention provides a specific series of treatments in which first the pulp is subjected to an acid treatment with hypochlorous acid, subsequently washed and then treated with alkaline hypochlorite under conditions of alkalinity maintained to substantially the end of the treatment.

I claim:

1. In the bleaching of pulp, the steps which comprise subjecting the pulp in aqueous suspension to hypochlorous acid to partially bleach the pulp, washing the pulp and subsequently subjecting the partially bleached pulp under a continuously maintained distinctly alkaline condition to an alkaline hypochlorite bleaching agent.

2. In the bleaching of pulp from resinous woods, the steps which comprise subjecting the pulp in aqueous suspension to a quantity of hypochlorous acid sufficient only to partially bleach pulp, and subsequently subjecting said partially bleached pulp to an alkaline hypochlorite bleaching solution continuously maintained alkaline to phenolphthalein throughout this subsequent bleaching stage to the end thereof.

3. The process of bleaching sulphate pulp, which comprises subjecting sulphate pulp in an aqueous suspension of about 3% consistency to a partial bleaching action with hypochlorous acid, washing the partially bleached pulp, subjecting the washed partially bleached pulp in an aqueous suspension of a consistency between 6 and 18% to the bleaching action of a dissolved hypochlorite while continuously maintaining the pulp suspension distinctly alkaline to the end of the latter bleaching operation, and washing the resultant bleached pulp.

In testimony whereof I affix my signature.

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