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PEROXIDE BLEACHING OF GROUND WOOD

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Our invention relates to the bleaching of ground wood, more especially ground oak and other ground woods such as chestnut, chestnut oak, maple, etc., which contain substantial amounts of tannin compounds and other natural color bodies.

In recent years much study has been given to the bleaching of ground wood. Usually and especially for the manufacture of newsprint, ground wood is not bleached. However, the desirable printing characteristics of paper containing a large proportion of ground wood have led to proposals for its use in high grades of paper such as magazine, book paper and the like. In many instances a base ground wood sheet or one containing a substantial proportion of ground wood is coated with a suitable coating composition. However, to be successful the ground wood must have a reasonably good color of substantial permanence, otherwise only a slight proportion of it may be used in the furnish; or if used in substantial proportion in the base sheet an undesirably heavy coat must be given it in order to have a final product of acceptable brightness.

One method currently proposed is the use of certain peroxides under alkaline conditions, e. g., hydrogen peroxide, sodium perborate, sodium peroxide, of which sodium peroxide is usually recommended as being the cheapest and easiest to handle. However, in applying known methods of peroxide bleaching to ground woods rich in tannin compounds it has not been possible to achieve the same or comparable brightness of the bleached pulp as is obtained with long fibered ground woods, as for example spruce. We have discovered that an improvement of several points on the General Electric Brightness Scale may be had by subjecting the ground wood rich in tannin to a preliminary caustic extraction which is then followed by the peroxide bleach, this improvement step being carried out with minimum expense in handling and materials and with no additional degradation of the fiber. Our explanation of the action of the extracting agent is that it removes color bodies and other substances which make it impracticable to obtain a brightness equal to that of bleached spruce ground wood.

After the peroxide bleach is laid the brightness may be further increased by the use of an after-bleach, as for example sulfurous acid in any of its several available forms, i. e., bisulfites and others yielding sulfite ion in effective quantities.

Our invention will be best understood by reference to the following detailed examples illustrative thereof.

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Example I

A 14.8 gram sample of red oak ground wood in the form of a slurry of 5% oven dried (O. D.) consistency was extracted for one hour at 77° F. with an NaOH solution at a concentration of 1 gram per liter. At the end of one hour the pulp was thickened and thoroughly washed. The extracted pulp was then treated with a quantity of sodium peroxide equal to 3.5% of the weight of the unbleached pulp on a dry basis, i. e., .525 gram. The pulp was in the form of a slurry of 5% consistency at a temperature of 92° F. The initial pH was 11.3. At the end of 220 minutes the peroxide was exhausted and 100 milliliters of a solution containing 5% SO₂ were added. After 20 minutes the pulp was thickened in a filter and washed. The brightness of the resulting pulp was 59.20 determined by the General Electric reflection meter. A similar test keeping conditions the same save that the caustic extraction was omitted resulted in a brightness reading of 55.4% whereby the gain in brightness due to the caustic extraction was 5.20%.

Example II

Essentially the same example was carried out as above except that in the peroxide bath there was added sodium silicate equal to 4% of the unbleached pulp, or .6 gram, and sufficient magnesium sulfate to make the concentration in the final mixture equal to 100 parts per million. The pulp during this treatment was in a slurry having 5% O. D. consistency and maintained at a temperature of 90° F. The initial pH of the mixture was 11.7. The peroxide was exhausted at the end of 350 minutes. 100 milliliters of 5% solution of sulfur dioxide were added and after 20 minutes the pulp was filtered and washed. The brightness of the resulting pulp was 61.8 as determined by the General Electric reflection meter.

In the caustic extraction step temperature has not been found to be critical. At 65° F. substantially the same results were obtained as at 140° F. The amount of caustic in the extraction step of 2% based upon the dry weight of the pulp may be increased somewhat, but thus far no beneficial results have been had when the quantity of caustic exceeded 16% based upon the dry weight of the pulp. In carrying out the peroxide bleach, brightening occurred at all pH's above 8 or 9 and improved substantially as the pH increased. It will be noted that in the examples given the highest pH was 11.7. This is not believed to be the limit. The amount of sulfite added in the

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after bleach stage is also not critical, although the brightness falls off when less than 5% of SO_2 based on the unbleached pulp is used. The reaction is rapid and not over 5 minutes is required for completion.

As indicated in Example II, sodium silicate and magnesium sulfate may be added to the above if desired. In some cases, however, no marked improvement resulted from their use.

In lieu of caustic soda other soluble hydroxyl ion yielding alkalis especially those having an alkali metal cation may be used. Examples are trisodium phosphate, sodium sulfide, sodium sulfite, sodium silicate, etc., as well as the corresponding salts of the alkali metals or ammonia.

We claim:

1. The method of peroxide bleaching of ground wood of the type rich in tannin and color bodies to yield a ground wood of a brightness at least equal to that which obtains by the peroxide bleaching of ground spruce wood, which comprises first extracting therefrom the tannin and color bodies soluble in dilute aqueous caustic alkali solution at temperatures under the boiling point thereof, then subjecting the extracted ground wood to the bleaching action of an alkaline solution containing an alkali metal peroxide.

2. The method of peroxide bleaching of ground wood of the type rich in tannin and color bodies to yield a ground wood of a brightness at least equal to that which obtains by the peroxide bleaching of ground spruce wood, which comprises first extracting therefrom the tannin and color bodies soluble in dilute aqueous caustic alkali solution at temperatures under the boiling point thereof, by treating same with a dilute solution of sodium hydroxide in quantity not sub-

stantially more than sixteen per cent. based upon the dry weight of the pulp, and then subjecting the ground wood to the bleaching action of an alkaline solution containing an alkali metal peroxide.

3. The method of peroxide bleaching of ground oak wood to yield a ground wood of a brightness at least equal to that which obtains by the peroxide bleaching of ground spruce wood, which comprises first extracting therefrom the tannin and color bodies soluble in dilute aqueous caustic alkali solution at temperatures under the boiling point thereof, then subjecting the extracted ground wood to the bleaching action of an alkaline solution containing an alkali metal peroxide.

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