

UNITED STATES PATENT OFFICE

2,030,383

METHOD OF TREATING PULP

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No Drawing. Application October 18, 1934,
Serial No. 748,922

7 Claims. (Cl. 92—14)

This invention relates to a method of treating pulp, and more particularly to a method of treating pulp prepared by the sulphate process, or by some similar alkaline process using a sulfide as an active cooking ingredient.

The coloring matter in sulphate pulp is largely composed of complex phlobotannin bodies containing sulphur in their composition. While the exact chemical constitution of the phlobotannin color bodies is not known with certainty, certain facts have been observed with respect to them. In general, the sulphur content of the color bodies increases as the sulphidity of the cooking liquor increases. As the concentration of sulphur in the cooking liquor increases, and as the cooking conditions are made more drastic by the use of higher cooking temperatures, the substitution of sulphur in the coloring matter increases and makes the coloring matter darker brown or black.

These sulphur derivatives of phlobotannin bodies are acidic in nature. In alkaline solution, the coloring matter is a darker red brown, while in acid solution it is a lighter brownish yellow. The coloring matter is darkest in color at pH 10.5 or above and lightest in color at pH 2.8 or below. The greatest percentage of color change occurs at pH 6.9 to 6.1.

The coloring matter in sulphate or kraft pulp does not attain its characteristic brown color until it comes in contact with oxygen. The oxygen may be in the wash liquor, water, or air. Before contact with oxygen, the coloring matter is a bright yellow, more or less dark, depending upon the sulphur content.

In order to improve the bleachability of sulphate pulp and obtain a bleached pulp of the desired degree of whiteness, it is necessary to remove the phlobotannin bodies from the pulp prior to bleaching and/or during the bleaching step. We have found that a portion of the phlobotannin bodies can be removed prior to bleaching by the use of a strong caustic solution.

Our invention is not limited, however, to the treatment of sulphate pulp to prepare the pulp for bleaching. By subjecting the pulp in the diffuser to the action of caustic soda, we have found that a lighter colored and brighter unbleached kraft pulp can be obtained. Other physical characteristics of the pulp are also so improved as to make feasible the use of the unbleached kraft pulp in the manufacture of special grades of paper.

It is therefore an important object of this invention to provide a method of treating sulphate

pulp to obtain a sulphate pulp of improved characteristics, such as color and brightness.

It is a further important object of this invention to provide a method of treating sulphate pulp to effect the more complete removal of phlobotannin bodies from the pulp.

Other and further important objects of this invention will become apparent from the following description and appended claims.

In the usual sulphate process for the manufacture of pulp, the pulp, at the end of the cooking operation, is blown from the digester into a diffuser, where the pulp is washed to remove the spent cooking liquor, or black liquor, as it is commonly known. In accordance with our method, before the usual washing step is commenced, an aqueous solution of caustic soda is introduced into the top of the diffuser in the space above the level of the pulp and is gradually forced downwardly through the mass of pulp, displacing the black liquor ahead of it. The body of caustic solution is, in turn, displaced by a following body of water or weak liquor introduced into the diffuser under pressure.

By this preliminary treatment with caustic soda, before the color bodies have had an opportunity to become oxidized, the color bodies are quite largely dissolved and removed. The caustic soda solution used in treating the sulphate pulp in the diffuser is preferably one that has been prepared by dissolving caustic soda in fresh water, although so-called "white liquor", as it is known in the sulphate process, which is a strongly alkaline liquor produced by causticizing green liquor, may be used.

The amount of caustic solution used in our method will vary considerably, depending upon the time of contact of the caustic liquor with the pulp, the concentration of the caustic liquor or solution, and the temperature of the mass in the diffuser. Ordinarily, however, between 2.5 and 15% of caustic soda (NaOH) by weight of the air dry pulp undergoing treatment constitutes the most satisfactory operating range. A caustic solution of a concentration of approximately 50% of NaOH by weight of the solution is very satisfactory. Using this percentage of caustic soda and a solution of this concentration, the operation can be efficiently carried out in a period of from 12 to 16 hours in diffusers of the usual size.

As previously stated, the treatment of the pulp in the diffuser with caustic solution is started as soon as possible after the pulp has been blown into the diffuser, so as to avoid any substantial oxidation of the phlobotannin bodies.

A caustic solution of the concentration above indicated is introduced into the space above the pulp in the diffuser and gradually forced downwardly through the mass of pulp and cooking liquor, displacing the cooking liquor ahead of it. After all of the caustic solution has been introduced into the diffuser, it is followed by weak liquor from the process, or by wash water, introduced under sufficient pressure, say about 15 lbs. per sq. in., to displace the body of caustic solution ahead of it at the desired rate, such that the operation may be completed in from 12 to 16 hours. The action of the caustic soda solution is to dissolve the phlobotannin bodies and sulphur derivatives thereof, and these bodies and derivatives are largely removed by the caustic soda solution and by the weak liquor or wash liquor following the caustic soda treatment.

As a result of the foregoing treatment of the pulp in the diffuser, the pulp is lighter colored and brighter and is generally better adapted for use in the manufacture of certain grades of paper than ordinary unbleached kraft pulp. If the pulp is to be bleached, our treatment considerably reduces the bleach requirements and gives a bleached pulp of improved paper making characteristics, as described in our copending application.

We are aware that numerous details of the process may be varied through a wide range without departing from the principles of this invention, and we, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

We claim as our invention:

1. The method of treating pulp which has been cooked with a cooking liquor containing a sulphur compound as an active ingredient thereof, which comprises subjecting the freshly cooked pulp before washing in a closed vessel to the action of a caustic solution of sufficient strength to dissolve color bodies present and then washing the pulp.

2. The method of treating sulphate pulp in association with its spent cooking liquor, which comprises passing a relatively strong caustic soda

solution through a mass of said pulp containing the original spent cooking liquor to displace said spent cooking liquor therefrom and dissolve phlobotannin color bodies, and subsequently washing said pulp.

3. The method of removing phlobotannin bodies from sulphate pulp, which comprises forcing through a freshly blown mass of pulp containing hot cooking liquor, a body of caustic soda solution prepared by dissolving caustic soda in water, displacing said body of caustic soda solution gradually downwardly by a following body of water under pressure and washing the treated pulp.

4. The method of removing phlobotannin bodies from sulphate pulp, which comprises introducing an aqueous caustic alkali solution on top of a hot mass of pulp containing cooking liquor in an enclosed space, forcing said solution gradually downwardly through said mass to displace the cooking liquor ahead of it, and displacing said solution from said mass by a following body of liquid.

5. The method of treating sulphate pulp, which comprises subjecting freshly cooked and blown sulphate pulp before washing to the prolonged action of an aqueous solution of caustic soda.

6. The method of treating sulphate pulp, which comprises subjecting freshly cooked and blown sulphate pulp before washing to the prolonged action of an aqueous solution of caustic soda, the amount of sodium hydroxide in said solution being equivalent to between 2.5 and 15% of the air dry weight of the pulp.

7. The method of treating sulphate pulp, which comprises subjecting freshly cooked and blown sulphate pulp before washing and while still hot to the prolonged action of an aqueous solution of caustic soda, said solution being added in the form of a fresh solution of sodium hydroxide of about 50% concentration.

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