

given as having stood the test of practice for some time.

To prevent the formation of wrinkles in shawls, it is better not to put them through the centrifugal dryer, but to hang them on rails to drip.

THE BLEACHING OF WOOL.*

The wool fibre naturally possesses a color varying from pale yellow to brown, gray, or even black. In the case of "white" wool, the pale yellow color is intensified by the scouring process, especially if the latter is at all severe. In order, therefore, that goods which are to be finished white, or in any pale colors, may exhibit their full beauty, it is necessary that this yellow tint should, as far as possible, be removed.

The "Tinting" Process.—For some classes of work it is considered sufficient to neutralize the yellow color by applying to the material a very dilute solution of some blue, purple or violet coloring matter, which, optically combining with the yellow, changes it to very pale gray. The latter being a neutral tint, is much less obvious to the eye, and therefore the wool appears less colored, or more nearly white than before this treatment.

The coloring matters chiefly employed for the purpose are indigo purple (sulphopurpuric acid), methyl violet, or some suitable acid violet; and the process consists in simply working the wool in a very dilute acid or neutral solution of the dye until the required degree of tinting is attained. It is evident, however, that the "white" obtained by this means will quickly re-assume its yellow tint when the fabric is washed.

In order to produce an effect at once more permanent and more nearly approaching a pure white, the natural yellow color of the wool must not merely be covered by tinting, but actually removed, and to this end a bleaching process is resorted to.

It is not customary to bleach wool which naturally possesses a dark color, such fibre being used for the production of brown, gray, etc., fabrics, or mixed with white fibre for drab or "natural" colored goods.

Bleaching Processes.—At the present time two entirely distinct methods of bleaching wool are practiced, and they differ, not only in the agents employed, but are also opposed in theory. In the older, and still most commonly used process, the coloring matter of the wool is acted upon by certain reducing agents, and thereby decolorized. The pigment does not, however, appear to be destroyed, because wool which has been bleached in this manner becomes gradually yellow again, probably by oxidation of the decolorized pigment.

The more modern process is based on the fact that the coloring pigment is destroyed by certain oxidizing agents, e.g., hydrogen peroxide, and has, indeed, only been commercially practicable since that substance was placed upon the market at a cheap rate.

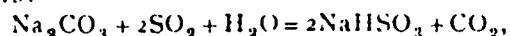
In carrying out the older process, which has been in use from time immemorial, sulphur dioxide, in the

gaseous form or in solution, is the reagent almost exclusively employed.

The Sulphur Dioxide Bleach.—When sulphur is burnt in air, sulphur dioxide (sulphurous oxide) gas is produced.

Cold water absorbs about thirty times its volume of this gas, forming sulphurous acid, which, like sulphur dioxide gas, readily absorbs oxygen when in contact with easily reducible substances, and is converted into sulphuric acid.

If sulphur dioxide gas is led into a solution of sodium carbonate, sodium hydrogen sulphite (bisulphite) is produced and carbonic acid is eliminated as follows:



and this body, which is sold as bisulphite of soda, is also employed as a bleaching agent. When bisulphite of soda is treated with a mineral acid, sulphurous acid is liberated.

Wool is usually bleached in the form of yarn or cloth, but is sometimes treated in the form of loose wool, and there are two methods of applying the sulphur dioxide as a bleaching agent, known respectively as the gas and liquid bleach.

In gas bleaching, which is also called stoving or sulphuring, the SO_2 is generated by burning the necessary quantity of sulphur, the resulting gas being led directly into the chamber containing the woollen cloth or yarn. The sulphur is ignited by means of a red-hot iron bar or cinder, and after ignition continues to burn without further application of heat. The bleach house or chamber in which the operation is conducted should consist of a buck room, the ventilating openings, doors, etc., of which are capable of being tightly closed. The roof of the chamber should be so constructed that the moisture condensed thereon cannot drop on to the material, since, being chiefly sulphuric acid of considerable concentration, this condensed liquid is a frequent cause of damage.

In conducting a bleaching process, the cloth or yarn is thoroughly wetted out and then placed upon the wooden rods with which the bleaching chamber is fitted. The chamber is then tightly closed, the fumes from the burning sulphur admitted, and the material allowed to remain all night. In the morning the chamber is first thoroughly ventilated and then emptied, the wool being subsequently well washed with water to remove sulphurous and sulphuric acids.

For thin material the rods may be advantageously replaced by rollers placed in series near the top and bottom of the bleaching chamber; and the cloth, travelling slowly, may be bleached by a single passage through the stove, the process being thus continuous.

The process of gas bleaching requires from 5 to 10 per cent. of sulphur calculated on the dry weight of the wool treated—the amount varying according to the thickness, color, etc., of the material.

In the liquid bleaching process a solution of sulphurous acid, or bisulphite of soda, is employed, in the latter case sulphuric acid being added in sufficient

* Prof. W. M. Gardner's Wool Dyeing