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METHOD OF DYEING.

No Drawing. Original application filed May 9, 1917, Serial No. 167,451. Divided and this application filed August 29, 1922. Serial No. 585,068.

To all whom it may concern:

Be it known that I, GEORGE S. BOHART, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in a Method of Dyeing, of which the following is a specification.

This invention relates to a method of dyeing cotton and other fibrous material with azulmic acid dye, which dye, together with methods of producing the same, is the subject of my original application Serial Number 167,451, of which this application is a division.

Azulmic acid is insoluble in water, but it is made soluble by the addition to it of an alkali or the solution of an alkali in water, as, for instance, a five per cent caustic soda solution, and I have found that this solution of azulmic acid in water containing an alkali has the property of dyeing cotton and other fabrics a variety of brown colors, depending on the concentration of the dye, which may be above or below a one per cent solution.

If, previous to its solution in an alkaline liquid, azulmic acid is treated with an oxidizing agent such as concentrated sulphuric acid, or a mixture of concentrated sulphuric acid and nitric acid, the fiber treated will be dyed a golden yellow.

The fabric to be dyed is immersed in an alkaline solution of azulmic acid, either hot or cold, and allowed to remain five minutes more or less, until the cloth is impregnated and saturated with the solution. Mechanical means, as rubbing or agitating, may be employed to hasten the absorption of the dye solution. The fabric is then wrung free of an excess of the dye solution and may be washed with water to remove more effectively the excess.

The fabric is then immersed in a dilute acid solution (say 1% hydrochloric or acetic acid) which must impregnate the fabric. The acid bath serves to neutralize the alkaline dye solution, with which the cloth is impregnated, and the azulmic acid is rendered insoluble again and the color is thereby fixed. The cloth is then washed in water to remove the last traces of acid. By this fixing process the color is made more resistant to washing and bleaching agents.

I have found that the azulmic acid is still further and more effectively fixed by immersing the fabric in an acid solution of a copper salt, as, for instance, a 5% copper sulphate solution with 1% sulphuric acid. This treatment with a copper salt may be an additional step after the acid fixing bath, or the copper salt may be dissolved in the acid bath. The copper solution renders the dye more sun-fast and resistant to laundry treatment. Other heavy metallic salts have similar effects to the copper treatment, as a cobalt nitrate solution for example. Shades of color may be regulated by this treatment with metallic salts in solution. The excess of fixing solution is washed out with water.

Oxidized azulmic acid dissolved in an alkaline solution to form a dye may be applied to fabrics exactly as described above in the use of azulmic acid, and is fixed with acids in an acid bath, as described. Metallic salts are effective in further fixing the oxidized azulmic acid. Yellow or golden shades of color are produced by the oxidized azulmic acid, varying with the concentration of the alkaline dye solution, and also with the choice of methods of fixing.

What I claim is:

1. The method of dyeing which comprises impregnating the article to be dyed with an alkaline solution of azulmic acid and then treating the article with a dilute acid.

2. The method of dyeing which comprises impregnating the article to be dyed with an alkaline solution of azulmic acid, then treating the article with a dilute acid, and then washing the article in water.

3. The method of dyeing which comprises impregnating the article to be dyed with an alkaline solution of azulmic acid and then treating the article with an acid solution of a salt of a heavy metal.

4. The method of dyeing which comprises impregnating the article to be dyed with an alkaline solution of azulmic acid, then treating the article with an acid solution of a salt of a heavy metal, and then washing the article in water.

In testimony whereof I hereunto affix my signature.

GEORGE S. BOHART.