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DESULPHURIZING RAYON IN THE PACKAGE FORM

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2 Claims. (Cl. 18—54)

One of the objects of this invention is to effectually remove sulphur from viscose rayon after spinning, by dissolving the sulphur on and in the filaments by the use of those sulphides and polysulphides in solution, in which the metallic portion of the binary compound may be any metal or radical (inorganic or organic) which specifically does not appreciably react with the material on which the filaments are placed to form soluble compounds, or which will not hydrolyze to create a hydroxyl-ion concentration which in itself will cause, or tend to cause, damage or corrosion to the material on which the rayon is placed, or the material of which the desulphurizing apparatus is constructed.

By "package" is to be understood the filaments wound on bobbin or spinning spool, or any other suitable arrangement whereby liquid is driven positively thru the cake of filaments. The "material on which the filaments are placed" is usually aluminum, rubber, phenolaldehyde condensation products, or stainless steel, and the desulphurizing apparatus is usually constructed of such materials as iron or a ferrous alloy, aluminum, nickel, wood and rubber.

Another of the objects of this invention is to effectually remove the sulphur from the filaments, without attacking the non-rayon components of the system, and hence preventing contamination of the rayon with their products of decomposition, and to make the process easier and more efficient by using an agent which does not cause excessive swelling and subsequent shrinkage of the rayon—such as results from the employment of sodium hydroxide.

The invention may be carried into effect by the employment of ammonium sulphide or ammonium polysulphide, or sulphide of a metal or radical, or of a basic inorganic or organic radical which in solution, aqueous or otherwise, does not appreciably attack the spool, or which does not result in a hydroxyl-ion concentration sufficient to cause appreciable corrosion of the materials normally employed upon which the package is formed, or of the apparatus in which the package is treated. Sulphide of ammonia under conditions employed in this invention may be handled in iron apparatus in the cold, and aluminum (the usual component of the spool) is not affected. In addition to being an exceptionally efficient desulphurizing agent in this respect, ammonium sulphide is satisfactory from the viewpoint of minimum corrosion.

Sodium sulphide or potassium sulphide are inapplicable in this method of viscose rayon desulphurization, for sodium or potassium ions in the proper environment will convert aluminum to sodium aluminate, whereas ammonium salts herein used will not, within the range of environment compreheneded in this invention. Moreover there are some acid desulphurizing agents such as sodium acid sulphite, which evolve sulphur dioxide gas, which do not seriously attack the spools but which do attack iron or ferrous alloys of which the desulphurizing bath is usually constructed, and are thereby contra-indicated and disclaimed in this invention.

As an illustration of carrying my invention into effect for the desulphurization of viscose rayon filaments wound on aluminum spools in apparatus using iron pipe lines, etc., I may employ as the sulphur removing solution an aqueous solution containing 0.6% of ammonium sulphide, to which sufficient ammonium hydroxide is added so that when a portion of the bath is tested by the addition thereto of a small amount of saturated aqueous solution of magnesium sulphate, a light precipitate of magnesium hydroxide will be formed (solubility product $1.2\times10-14$), indicating a hydrogen ion concentration at which corrosion of both aluminum and iron is minimized. (See Hydrogen Ions, by Britton, 1929 ed., p. 258.) The rayon is immersed, circulated or otherwise brought into contact with the desulphurizing solution until all sulphur has been removed, after which the package containing the rayon is washed free from reactants and is otherwise treated by ways now known.

It is to be understood that the above example is given merely for purposes of illustration, and may be departed from materially without affecting the essence and underlying principles of this invention. Where a partial vacuum is used to serve as the motive force for driving the desulphurizing solution thru the more or less compact cake of rayon, the vacuum efficiency is regulated by the vapor pressure of the solution, which in turn depends upon the temperature. For this reason best efficiency is obtained when a solution is used in the cold. The mixture specified is of this type. No question of the color is involved, as in the process of U. S. P. 1,702,837 of Merriman.

Instead of ammonium sulphide, many other sulphur-containing compounds are suitable in that they fulfill the conditions as above outlined. Satisfactory results have been obtained by me in the employment of alkyl substituted ammonium sulphides, such as dimethyl ammonium sulphide or diethyl ammonium sulphide or aryl

ammonium sulphides. Where the sulphide is of limited solubility in water, the material is dissolved in an appropriate solvent or solvent combination before use, or may be employed in a finely divided condition in suspension, or only partially in solution.

I hereby claim:—

1. A method of desulphurizing rayon in package form with minimum effect upon or contamination by the material of either the device on which the rayon is held or the apparatus in which it is desulphurized, where said material includes one substance affected less as the solution is made more alkaline and another substance affected less as the solution is made more acid, consisting in treating the rayon in such package form in such apparatus in a solution of sulphide of ammonia containing ammonium hydrate in such quantity that the hydroxyl ion concentration of the solution is such that effect upon and contamination by both of said substances is minimized.

2. A method of desulphurizing rayon in package form with minimum effect upon or contamination by the material of either the device on which the rayon is held or the apparatus in which it is desulphurized, where said material includes both iron and aluminum, consisting in treating the rayon in such package form in such apparatus in a solution of sulphide of ammonia containing ammonium hydrate in such quantity that the hydroxyl ion concentration of the solution is such that effect upon and contamination by both iron and aluminum is minimized.

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