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PRODUCTION OF THREAD FROM VISCOSE

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This invention relates to the manufacture and production of yarns, threads, filaments and the like articles, hereinafter referred to as threads, from viscose wherein the viscose is extruded through a jet or jets into a coagulating bath comprising an aqueous solution of sulphuric acid and at least one metallic salt. During the spinning of viscose prepared from highly purified woodpulp cellulose there is a tendency for the orifices of the jet to become partially or completely blocked owing to the formation of a precipitate on the wall of the orifices so that the threads obtained have a smaller number of filaments or have filaments of a smaller denier than the filaments of threads obtained at the commencement of the spinning. The formation of the precipitate on the jet also necessitates more frequent changes of the jets involving labour and loss of production.

The object of the present invention is to provide an improved process wherein the tendency for the jets to become partially or completely blocked is considerably reduced.

Several proposals have been made for facilitating the spinning of viscose by the addition to the spinning solution and/or to the spinning bath of various substances. In U. S. specification No. 1,446,301, issued to H. J. Hegan on February 20, 1923, and assigned to Courtaulds Ltd., it is claimed that viscose prepared from cotton cellulose can be spun more easily if it contains a substance which will lower the surface tension of the viscose. The use of sodium oleate is recommended for this purpose and very small quantities are proposed, for example 2 parts by weight of sodium oleate in 10,000 parts of viscose.

In U. S. specification No. 1,655,626 is described the addition to viscose of a small quantity of an alkaline metal sulphonated non-mineral oil, for example, sulphonated castor oil, for the purpose of reducing the surface tension. British Patent No. 336,250 describes the addition to viscose of small quantities of the true sulphonic acids obtained from aliphatic or cyclo aliphatic hydrocarbons containing at least 8 carbon atoms. In British specification No. 340,564 the use of a small proportion of a sulphonated fatty oil such as Turkey red oil is recommended for the purpose of diminishing the surface tension of the viscose and thereby preventing the jets from becoming choked during spinning. British Patent No. 363,441 claims the addition of cholic acid or a bile acid derivative thereof to viscose in very small quantities, for instance as low as 0.01 per cent. All of the above compounds are "anion-active," that is to say, it is the anion which imparts the surface-active or surface tension reducing property. More recently patents have been issued for the use in the spinning process of "cation-active" compounds, that is, compounds in which the cation possesses surface activity. We mention, for example, U. S. specifications Nos. 2,125,031, 2,145,527, 2,179,195 and 2,179,196, which described the extrusion of a cellulosic solution through spinneret orifices in the presence of a dissolved cation-active substance that is substantially stable under spinning conditions. It is stated that it is, of course, necessary to select a cation-active compound which is not adversely affected by the acid of the bath and is substantially stable when used therein and/or one that is stable in viscose when used therein. Tetra-alkyl ammonium bases and salts and aryltrialkyl ammonium bases and salts are stated to be specially suited for addition to the alkaline spinning solution such as viscose, while pyridinium compounds having linked thereto extended aliphatic chains, such for instance as dodecylpyridinium sulphate, are suitable for adding to the spinning bath into which the viscose is extruded.

According to our present invention, we produce threads by extruding into a bath containing sulphuric acid and at least one metallic sulphate viscose containing a small proportion of a cation-active compound and also an anion-active compound, in amount greater than the equivalent of the cation-active compound present. When a solution of the anion-active compound is added to a solution of the cation-active compound, a precipitate of the two compounds is formed but if more anion-active compound is added, a point is reached at which the precipitate is soluble in alkaline solution. Under the expression "an anion-active compound in amount greater than the equivalent of the cation-active compound present" we mean such a quantity of the anion-active compound as will both produce the precipitate with the cation-active compound and will also redissolve the precipitate in the presence of alkali. The solution containing the cation-active compound and excess of anion-active compound can be obtained by taking an alkaline solution of the anion-active compound and adding to it a quantity of cation-active compound such that in the result a solution with no precipitate is obtained although during the addition of the cation-active compound some precipitation may have occurred.

The anion-active compound may be added to the viscose as such, or a non-ionogenic compound

which will hydrolyse in the presence of alkali to give an anion-active compound may be used.

The advantage of our invention lies in the fact that the presence of the anion-active compound stabilises the cation-active compound in the presence of alkali, so that we can add to the viscose small quantities of such cation-active compounds as dodecyl pyridinium sulphate, which in the absence of the anion-active compounds would be decomposed by the alkali in the viscose before the viscose reaches the spinning jet. Even in the case of cation-active compounds such as tetra-alkyl ammonium bases which are comparatively stable in the presence of alkali, their stability is increased by the presence of the anion-active compound, so that smaller quantities of the cation-active compound can be employed to produce the same result.

In carrying out the process of the present invention, we prefer to mix the cation-active and anion-active compound together before addition to the viscose, but if the said compounds are added separately, the anion-active compound is preferably added first so as to avoid any considerable decomposition of the cation-active compound by the alkali of the viscose.

Examples of cation-active compounds which may be used according to the present invention are compounds of the type of the long-chain fatty pyridinium salts such as octadecyl pyridinium bromide or lauryl pyridinium sulphate, or of the type of diethylamine ethyl oleyl amide hydrochloride ($C_{17}H_{33}.CO.NH.C_2H_4.N(C_2H_5)_2.HCl$.)

Anion-active compounds which may be used include Turkey red oil and other sulphonated oils, long-chain alkyl sodium sulphates, pulp resin soaps and alkyl naphthalene sodium sulphonates, also sodium oleate and like soaps insofar as they are sufficiently soluble in the viscose.

Examples of non-ionogenic compounds which hydrolyse in alkaline solution forming surface-active anions include polyglycol laurate and polyglycerol stearate.

Only very small quantities of the cation-active substances need be added to the viscose in order to obtain the benefits of this invention. Good results can be obtained when adding .002 or even .001 per cent. of the cation-active substance to the viscose. The proportions of the cation-active compound and the anion-active compound to be used may vary somewhat. For instance, when a sulphonated oil is employed as the anion-active compound, two or three parts by weight thereof may be taken for each part of the cation-active compound. In the case of the said hydrolysable non-ionogenic compound, such as polyglycerol stearate, it may be desirable to use ten times the weight thereof compared with the cation-active compound employed.

The following example illustrates a method of carrying into effect the present invention, but the invention is not restricted to this example. The parts are by weight.

Example

100 parts of octa decyl pyridinium bromide dissolved in 400 parts of water are added to 500 parts of Turkey red oil dissolved in 900 parts of water. 100 parts of 20 per cent. caustic soda solution are then added. The product is a clear solution. 0.04 part of this solution is added to 100 parts of viscose during the mixing of the latter and the mixture is extruded into a coagulating bath containing 8 per cent. suphuric acid, 15 per cent. of sodium sulphate, 1 per cent. of zinc sulphate and 10 per cent. of glucose. There is a considerable reduction in the occurrence of choked orifices in the jets.

What we claim is:

1. The production of threads by extruding into a bath containing sulphuric acid and at least one metallic sulphate viscose containing a small proportion of a cation-active compound and also an anion-active compound sufficient in amount both to produce a precipitate with the cation-active compound and also to redissolve the precipitate in the presence of alkali.

2. The production of threads by extruding into a bath containing sulphuric acid and at least one metallic sulphate viscose containing a small proportion of a cation-active long-chain fatty pyridinium salt and also an anion-active compound sufficient in amount both to produce a precipitate with the cation active salt and also to redissolve the precipitate in the presence of alkali.

3. The production of threads by extruding into a bath containing sulphuric acid and at least one metallic sulphate viscose containing a small proportion of a cation-active long-chain fatty pyridinium salt and also Turkey red oil sufficient in amount both to produce a precipitate with the cation-active salt and also to redissolve the precipitate in the presence of alkali.

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