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CRUSTATION-INHIBITED VISCOSE
SPINNING SOLUTION

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This invention relates to the manufacture of artificial silk, and more particularly to an improved viscose spinning solution and a method of spinning or extruding the same into filaments, threads, ribbons, sheets, or the like.

In the manufacture of viscose silks, the filaments, threads, or the like are formed by extruding a viscose solution from tube-like members, called spinnerettes, having relatively small or minute orifices, slits, or openings. These spinnerettes generally have been formed of platinum or other precious, highly chemical resistant metals, or of alloys of precious metals, for example, gold, and platinum; but due to the high cost of such metals, viscose silk manufacturers have also resorted to the use of spinnerettes formed of glass.

A difficulty encountered with spinnerettes constructed of precious metal or glass is that the viscose solution has a tendency to crater or coagulate about the orifices at the inside of the spinnerettes and block or partially block the orifices. This results in imperfect yarn or filaments and necessitates frequent interruption of the spinning process to clean the orifices of the spinnerettes. In cases where glass spinnerettes are employed, a further difficulty is encountered, to wit, that the viscose solution has a corroding effect on the spinnerettes, and causes them to wear rapidly, probably due to the dissolution of very fine particles of silica by the solution. This requires frequent replacement of the spinnerettes which necessitates interrupting production.

An object of the invention is to provide a viscose solution or spinning composition which greatly decreases cratering or coagulation at the spinnerette orifices.

Another object is to provide a viscose solution which prevents clogging of the spinnerette orifices.

Another object is to provide a viscose composition which reduces the wearing action on the spinnerettes.

Another object is to provide a viscose composition which forms a film at the spinnerette orifices and protects them against the corrosive action of the composition.

Another object is to provide a viscose spinning solution which enables glass spinnerettes to be used as advantageously as more expensive spinnerettes formed of precious metals.

Another object is to provide a viscose spinning solution containing a compound or reaction product which facilitates spinning the solution but does not affect the quality of the yarn.

A further object is to provide a method of spinning viscose solutions which is economical, eliminates frequent interruption of the process and minimizes cleaning or replacement of the spinnerettes.

Other and further objects will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

These objects are accomplished by preparing viscose solutions or spinning compositions in any well known or preferred manner, for example, by treating cellulose material with caustic; pressing, shredding, and aging; xanthating, that is treating the alkali cellulose with carbon bisulfide to form "yellow crumbs"; dissolving the "crumbs" in dilute alkali; and ripening. Subsequent to the ripening step and prior to the spinning of the solution in an acid bath, a desired quantity of a compound or reaction product adapted to prevent cratering in the spinnerettes or excessive wear thereof is added.

In accordance with the invention, it has been found that ammonia-treated chlorinated hydrocarbons having between eight and thirty carbons, but preferably between twenty-two and twenty-eight carbons are suitable for facilitating the extrusion of the solution. Such compounds may be prepared in any suitable well known manner, for example, by chlorinating paraffin hydrocarbons, preferably paraffin wax, and treating the chlorinated hydrocarbon with ammonia in either gaseous or liquid state. The compounds or reaction products may be chlorinated to contain between 21 and 52% chlorine, and when treated with ammonia, may contain between 8.0 and 14% chlorine and between 4.5 and 7.1% nitrogen. These products may be economically prepared from available raw materials at relatively small cost.

It has further been found that these products or compounds are readily compatible, at low concentrations, with viscose solutions. Small amounts of chlorinated hydrocarbon-ammonia reaction products give the desired beneficial results, whereby the cost of the spinning composition is not materially increased. The products may be used in concentrations between 0.1% and 1%, but preferably between 0.2% and 0.6%.

In practice, it was found that the addition of the chlorinated hydrocarbon-ammonia reaction products provided a protective film for the spinnerettes and prevented clogging or cratering at

the orifices. This filming action is believed to be due to the fact that chlorinated hydrocarbon-ammonia reaction products contain positive surface active ions which act to prevent the viscose solution from wetting the interior of the spinnerettes and cratering or coagulating thereon. Where glass spinnerettes were used, wearing or corroding thereof was greatly reduced. The addition of the reaction product to the viscose solution did not affect the strength or color of the yarn produced.

The viscose solutions may be prepared as described in the following examples.

Example I

Paraffin wax was chlorinated to contain 21% chlorine and was treated with ammonia (NH₃) to form a liquid reaction product containing about 8.0% chlorine and about 4.5% nitrogen. About 5 parts by weight of the product were added to about 995 parts by weight of viscose solution prepared for spinning and were mixed therewith to provide a spinning composition having a 0.5% concentration of chlorinated hydrocarbon-ammonia reaction product. At this concentration and also at lower concentrations the product was readily miscible with the viscose composition.

Example II

Paraffin wax was chlorinated to contain 52% chlorine and was treated with ammonia (NH₃) to form a solid reaction product containing about 14% chlorine and about 7.1% nitrogen. About 5 parts by weight of the product were added to about 995 parts by weight of viscose solution prepared for spinning and were dissolved therein to provide a viscose spinning composition having a 0.5% concentration of reaction product. By using these amounts or less, the solid reaction product could be readily dissolved in the viscose solution.

Example III

The reaction products used in Examples I and II were each used in concentrations of 1%, that is, 1 part reaction product and 99 parts viscose solution. The viscose and reaction product were

thoroughly mixed by stirring and the resulting mixture became slightly opaque indicating that complete solubility could be had at slightly lower concentrations of reaction product.

From the foregoing description and examples, it will be seen that the present invention provides an inexpensive viscose solution and a method of spinning viscose yarn which eliminates cratering, corroding, or clogging of the spinnerette orifice. These difficulties heretofore encountered are eliminated in an efficient manner without appreciable increase in the cost of the yarn or impairing its strength or color. The method of producing the yarns eliminates frequent shut downs for repair or replacement of the spinnerettes and consequently increases production.

It will be understood that the details and examples hereinbefore set forth are illustrative only, and that the invention as broadly described and claimed is in no way limited thereby.

What I claim and desire to protect by Letters Patent is:

1. A viscose solution containing a reaction product of chlorinated aliphatic hydrocarbons of from 8 to 30 carbon atoms and ammonia having a 4.5 to 7.1% nitrogen content and an 8.0 to 14% chlorine content.

2. A viscose solution containing a reaction product of chlorinated paraffin and ammonia having a 4.5 to 7.1% nitrogen content and an 8.0 to 14% chlorine content.

3. A viscose solution containing between 0.1 and 1.0% of a reaction product of chlorinated paraffin and ammonia having a 4.5 to 7.1% nitrogen content and an 8.0 to 14% chlorine content.

4. A viscose solution containing between 0.1 and 1.0% of a reaction product of chlorinated aliphatic hydrocarbons of from 8 to 30 carbon atoms and ammonia having a 4.5 to 7.1% nitrogen content and a 8.0 to 14% chlorine content.

5. A viscose solution containing 0.5% of a reaction product of chlorinated paraffin and ammonia having a 4.5 to 7.1% nitrogen content and an 8.0 to 14% chlorine content.

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