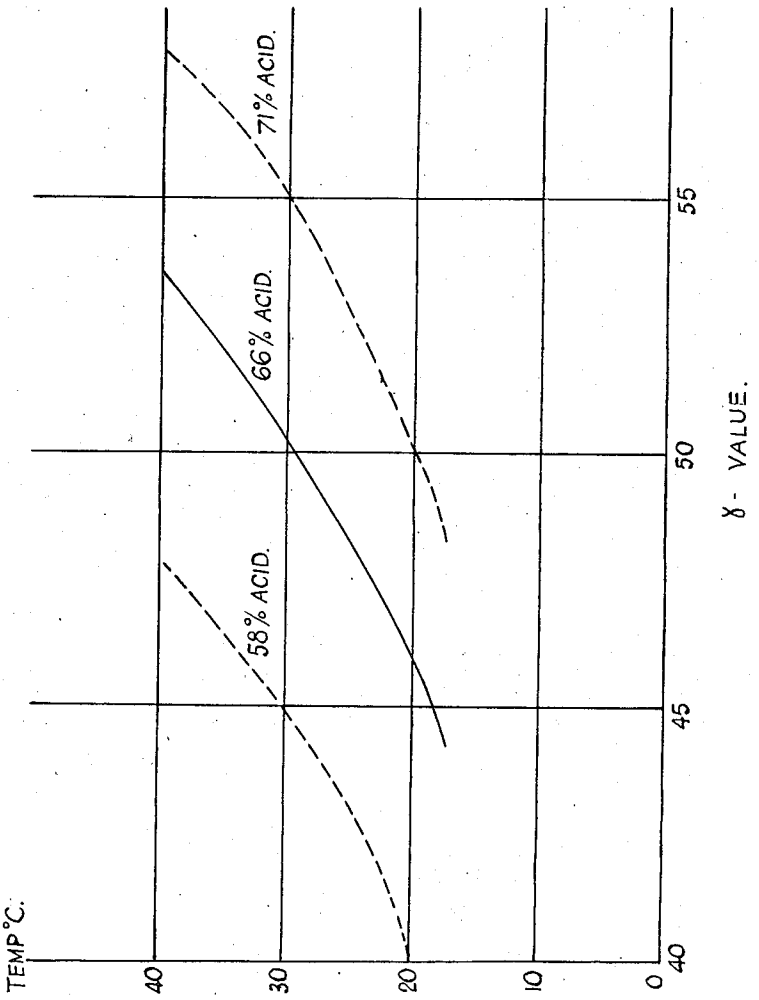
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PRODUCTION OF VISCOSE RAYON

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PRODUCTION OF VISCOSE RAYON

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1 Claim. (Cl. 18—54)

This invention relates to the production of high quality viscose rayon and is an improvement in or modification of the invention claimed in copending application No. 173,924 (now Patent No. 2,586,796).

In said copending application No. 173,924 there is described a process for the production of high quality viscose rayon filaments having in the air-dry condition a tenacity greater than 4.8 gm. per denier and an elongation at the breaking point greater than 8%, which process comprises extruding into a bath of sulphuric acid at normal room temperature, i. e. about 10 to 30° C. a viscose prepared from cellulose containing less than 25% by weight of molecular chains with a degree of polymerisation below 500 and less than 4% by weight of molecular chains with a degree of polymerisation below 250, said viscose being prepared via alkali-cellulose of which the mean degree of polymerisation after ripening is greater than 450, which viscose has a degree of xanthogenation (γ) (as defined below) between 40 and 50, the concentration of sulphuric acid in the said bath being between 57.5 and 73% and being defined by the formula:

$$\text{Percentage concentration by weight of sulphuric acid} = 1.26\gamma + 8 \pm 3 \quad (1)$$

thereafter subjecting the extruded filaments to a stretching operation to increase their length by 150 to 280% while they are still wet from the spinning bath, washing the filaments and allowing them to relax, and then winding or winding and twisting the filaments thus obtained.

The degree of xanthogenation of the cellulose, represented by the symbol γ, is the number of hydroxyl groups substituted by —CSS— groups per 100 glucose units (i. e. $C_6H_{10}O_5$ units).

It is indicated that in the preferred form of that invention the viscose has a γ-value between 44 and 47 and the concentration of sulphuric acid is between 58.5 and 72 and is given by the formula

$$1.26\gamma + 8 \pm 2$$

The said application is concerned substantially with spinning at room temperature and this is defined as 10 to 30° C. It has now been found that the optimum conditions vary somewhat with temperature, even within the range of room temperature stated and that by properly relating the other conditions to the spinning temperature selected, products of still better quality can be obtained.

In the accompanying drawing there is shewn the curve which is found to relate optimum temperature of spinning and the gamma value at an acid concentration of 66%. By calculation from Formula 1 it will be seen that the optimum γ-value for use with sulphuric acid of 66% strength is 46 and it will be noted that this point on the curve occurs at 20° C. In other words the optimum conditions set forth in the said co-pending application are conditions as at 20° C. which is in fact a normal comfortable room temperature. At higher temperatures

however, using the same acid bath, viscoses of higher γ-values are required if the best results are to be obtained. Thus at 40° C. a viscose of γ-value 54 gives the best results.

Curves obtained for all practical acid concentrations are found to run parallel and two other curves are shewn in broken line in the drawing representing the conditions at 58% and 71% acid concentration respectively.

According to the present invention therefore a modification of the process of said application No. 173,924 is characterised by the use of a spinning temperature above 20° C., the γ-value, acid concentration and temperature of spinning being selected and related to correspond to a point on one of the curves of the accompanying drawing or on a curve parallel thereto, each of said curves, at the point indicated by a temperature of 20° C., giving a relationship of γ-value to acid concentration which satisfies the formula set forth in the said co-pending application. This relationship between acid concentration (C), temperature (T) and gamma value (γ) is set forth in the following formula:

$$C = 1.26[\gamma - (T-20)^{0.7}] + 8 \pm 3$$

It is found that by employing spinning temperatures above 20° C. and the gamma values and acid concentrations necessary to lie on a point on one of the said curves corresponding to said higher temperature an improvement in the products is obtained which may amount to 0.2 to 1 g./denier in the tenacity. Generally it is undesirable to spin at temperatures above 40° C. As will be seen from the full-line curve, representing an acid concentration of 66%, the optimum γ-values with increasing temperatures are:

Temperature:	γ-value
20	46
23	48
30	51
40	54

A small departure from these optimum values is of course permissible.

We claim:

Process for the production of high quality viscose rayon filaments having in the air-dry condition a tenacity greater than 4.8 g. per denier and an elongation at the breaking point greater than 8% which process comprises extruding into a bath of sulphuric acid at a temperature between 20° C. and 40° C. a viscose prepared from cellulose containing less than 25% by weight of molecular chains with a degree of polymerization below 500 and less than 4% by weight of molecular chains with a degree of polymerization below 250, said viscose being prepared via alkali cellulose of which the mean degree of polymerization after ripening is greater than 450, and interrelating the concentration (C) of the sulphuric acid in said bath, the temperature (T) of the bath and the γ-value of the viscose according to the formula:

$$C = 1.26[\gamma - (T-20)^{0.7}] + 8 \pm 3$$

with (C) between 58% and 72% and the γ-value between 40 and 53, and thereafter subjecting the extruded filaments to a stretching operation to increase their length by 150% to 280% while they are still wet from the spinning bath, washing the filaments in a more dilute acid bath and allowing them to relax while still in the acid condition, and winding the filaments thus obtained.

References Cited in the file of this patent

UNITED STATES PATENTS

2,327,516	Fink et al.	Aug. 24, 1943
2,586,796	Drisch et al.	Feb. 26, 1952