- (4) SO_2 gas was neutralized in alkali cooking in which operation 1 % NaOH to the pulp is used. The operation become odourless.
- (5) The quantity of resin in residual solution of alkali cooking was 0.4~0.85 % but it is possible to utilize it making the concentration of resin high by repetition the use of the residual solution.

Judging from the above mentioned results, I found the necessity of changing the sulphite single short cooking method. Because, the harmful inter-correlation was dissolved and quality control became possible.

ON THE SECTION OF VISCOSE SILK. III. ON THE RELATION OF THE SPINNING BATH AND THE SECTION

by Z. Kawata

(Received 2nd Aug., 1941)

Experimental process.

Viscose, which is prepared by the usual method containing 8 % cellulose and 7 % alkali, is spun with a spinning bath of several compositions under equal conditions; and the fibers after finishing are tested as to their qualities as follows.

1. good or bad result in spinning and twisting and the existence of nap.
2. appearance (colour and luster)
3. softness.
4. tensile strength and elongation.
5. dyeing affinity of direct dyestuff.
6. cross section and their surface ratio (α) and serration coefficient (β).

At first we spun the viscose with a H_2SO_4 bath, then gradually added Na_2SO_4 in the bath, and at last added considerable ZnSO_4 to it. as a consequence we have learned the following particulars.

- A. Nap is apt to occur in fibers of less serration and their quality is inferior.
- B. Serrations are produced remarkably by addition of ZnSO_4 in the bath.

Next we spun the viscose in a bath containing Fe-, Ni-, Al-, Mg or NH_4 - in addition sulphate instead of Zn-Salt individually, and then in addition added ZnSO_4 in these baths. As the results of these experiments, we may conclude that: "In order to make serration of cross section of viscose fiber, it is necessary that there exist two or more positive radicals besides sulphuric acid in the spinning bath, and one of them must be light or heavy metallic radical and another is always Na-radical as the viscose is Na-salt. If there are two metallic radicals in the bath, it will produce superior results." In practice it is limited to the use of Zn-, Mg-, and Al-salts as the other radicals harm qualities of the fibers in precipitation and colour.

Compositions of a spinning bath of viscose silk are H_2SO_4 , Na_2SO_4 and metallic sulphate as normal and serration is produced only under the conditions of the one bath. When viscose is added to the spinning bath, neutralisation, salting out, combination of metallic radical and decomposition of impurities occur simultaneously and then the regeneration of cellulose. Metallic combination on the surface is irregular owing to dilution by water from viscose and neutralisation, interrupted by gas produced from the decomposition of impurities and the flow of liquid; these positions make serration after the regeneration. The two bath method, which is a salt solution as the first bath and an acid solution as the second bath, does not produce serration. These reactions are assumed to cause a colour change during the spinning process.

H_2SO_4

Reactions are neutralisation, decomposition of impurities and regeneration of cellulose. The proper quantity to use is 90~140 g/l and 5~10 % of cellulose at a concentration of 1.5~3.0 % to complete regeneration of cellulose remains on the fiber after the spinning.

Na_2SO_4

Reactions are salting out and oppression of acid reaction. It is necessary to maintain a constant quantity in the bath as it increases in the spinning process. The speciality is to produce good luster, softness, dyeing affinity and strength. The proper quantity to use is 90~250 g/l varying according to the amount of other salts.

ZnSO_4

The reactions is a combination on the surface of fiber to produce serration. The special results are a pronounced effect by the addition of a small quantity, prevention of nap and the producing of good luster, softness, elongation and serration. So it is used generally in practice. The maximum effect in producing serration is at 30~40 g/l, but on the contrary nap occurs at this proportion, and the proper quantity to use is 10~20 g/l.

MgSO_4

Reactions are salting out and combination. The speciality is to produce good appearance, good luster, softness and serration. Corresponding weight (equal effect on fiber) to ZnSO_4 is 6~10 times of it. The proper quantity of use is 60~220 g/l varying according to the amount of other salts.

$\text{Al}_2(\text{SO}_4)_3$

Reaction is equal to MgSO_4 , but it is not economical and has no superiority so it is not generally used. Corresponding weight to ZnSO_4 is 4~6 times.

$(\text{NH}_4)_2\text{SO}_4$

Reactions are salting out and combination. The special results are quick combination and hardness, strength and transparency. It is used to make cellphan and other special spinning. The proper quantity to use is 30~100 g/l varying according to the amount of other salts.

Glucose

Reaction is to control spinning reaction and the special results are to produce softness, elongation and dyeing affinity and to prevent dryness of fiber cake. The proper quantity to use is 55~150 g/l varying according to the spinning process.