RESEARCHES ON GLUCOSE FOR COAGULATING BATH. II.

Manufacture of Glucose from Cellulose.

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The author studied on the manufacture of glucose from the regenerated cellulose materials such as rayon rags, waste rayon fibre, waste viscose etc. The method of manufacture is distinguished from starch acid method. (G. W. M. Williams, *J. Chem. Soc.*, 1921, CXIX, 803; V. Hottenroth, 1925, D.R.P. 356309).

General Method. The cellulose materials are mixed with a concentrated sulphuric acid, which is cooled with water to prevent carbonization of cellulose by the reaction heat, and the mixture is left to stand for many hours until the fiber disappears. The mixture is then diluted with a large amount of water and boiled for several hours. When the solution has become a thin viscous liquid without an insoluble matter, it is cooled and filtered, and used for the coagulating bath.

(1) Concentration of acid. When the concentration of sulphuric acid is too strong, the cellulose is carbonised and the yield is small, while, when it is weak, the reaction is slow and the yield is also poor. The suitable concentration of acid is 75~85% H_2SO_4 .

(2) Duration of standing. The mixture of cellulose and acid must be stood until the fiber disappears, otherwise the yield of glucose is poor.

(3) Dilution of the mixture. If the solution is too diluted, a greater amount of dextrine is remained; on the contrary if it is too concentrated, glucose is partly carbonised. The most proper quantity of water is 6~7 times as much as cellulose.

(4) Time of boiling. The longer the time of boiling, the better the yield of glucose. The time of boiling is desirable to be at least three hours. (Fig. 1)

(5) Ratio of cellulose and acid. When a larger volume of acid is used, the mixing of cellulose and acid is more easy and the yield of glucose is also better. When a less volume of acid is used, the mixing is difficult and it is necessary to stand it for longer time. The most suitable quantity of acid is the weight to give di-ester. (Fig. 2.)

Fig. 1

(6) Influence of addition of salts (Zn, Mg, Na). When the salt is added to the mixture, the yield of glucose is slightly improved, so that the addition of salts is undesirable.

(7) Normal cellulose. When the purified cotton is used instead of the regenerated cellulose for the same method of manufacture, it is necessary to stand the mixture for longer time, and the yield of glucose is almost equal but the solution contains a little much insoluble matter.

Fig. 2. [H_2SO_4 (85%) 7 parts, Cellulose Variable part.]