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PROCESS FOR PREPARING STARCH PRODUCTS

Meindert Danius Rozenbroek, Delden, Netherlands; vested in the Alien Property Custodian

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It is known to prepare dextrine by heating starch at a high temperature, if desired in the presence of small quantities of acid. In such processes the raw material to be dextrinized (eventually after a diluted acid has been added) is carefully dried, thereupon heated, cooled and moistened. The degree of moistening is chosen in such a way that the same corresponds with that of the product in an air-dry condition.

I have found that it is possible to improve the known process by carrying out the dextrination with large proportions of a suitable acid at such a moisture content and in such a way that after the dextrination is finished the product obtained possesses a moisture content corresponding with the moisture content of the product in an air-dry condition.

In order to attain this result the starch to be treated (if desired after a partial drying) is mixed with a predetermined proportion of a suitable acid. The acidulated flour is left to itself, during a longer or shorter period at room temperature, or the same is gently heated, e. g. to about 50° C. and at any rate not higher than 80° C. care being taken that the loss of water is no more than necessary for giving the treated final product a water content equal to that of the air-dry product. Finally the excess of acid is neutralized with a suitable alkali.

The advantages of my process are:

1. No drying or only a partial drying is necessary.

2. No heating or only a low heating is necessary.

3. No moistening of the dextrine is necessary. The final product has at once the desired moisture content which is necessary for the air-dry state of the product.

4. Formation of lumps which as a rule occurs during drying and moistening is prevented.

5. Very little decolouring of the product.

6. It is possible to use acids which would cause carbonisation at high temperature; e. g. sulphuric acid, sodium bisulphate.

7. Simplicity of the process.

My invention will now be elucidated by the following examples which, however, do not limit the scope of my invention.

Example I

Potato flour containing 20% of moisture is dewatered till a content of 4%. Thereupon 16% hydrochloric acid of 10% are added, and the product is left to itself during four days at room temperature, after which period the product is heated to 40–50° C. during a short time. Finally the product is neutralized with sodium carbonate.

Example II

Potato flour containing about 3% moisture is mixed with 12% of its own weight of a solution of sulphuric acid in water of 20%. During the mixing with the diluted acid one may cool. Thereupon the product is gently heated to 40° C. Care is taken that no or nearly no water is evaporated. Finally the product is neutralized.

Example III

Potato flour with 8% moisture is mixed with 10% of a solution of nitrogenic acid in water of 30% and thereupon the product is treated as described in Example II.

The acidulated product may also absorb acid in the form of a gas or vapour. This absorption may take place before or after a heating and before or after a cooling, but can also take place without heating.

Instead of hydrochloric acid, sulphuric acid, nitrogenic acid, one may also use other acids or acid yielding substances e. g. phosphoric acid, acetic acid, acetic acid anhydride, acetylic chioride, oxalic acid and also acid salts e. g. sodium bisulphate and the like.

Instead of potato flour I may also use other starches or starch containing products for dextrinizing the same, e. g. maize, rice, wheat, tapioca flour, and also glutine containing starches e. g. wheat flour and the like and further inferior qualities containing cellulose and/or protein. It is also possible to use starch products which have been converted by treating with oxydizing means or enzymes such as ozone, peroxydes, chiorine, hypochlorites and the like.

I may also use products pre-dextrinized in a different way as a raw material for my process. The heating may be carried out in closed vessels under pressure or without pressure, and also in agitating or mixing vessels, conveyor troughs and on conveyor belts or the like.

Further I may pre-dextrinize the starch after which I may neutralize completely or in part, dry the product carefully and continue the dextrinizing by heating at a higher temperature; finally the product is cooled and moistened in the known way.

Example IV

Potato flour is dried till it contains about 8% of moisture after which 6% of nitrogenic acid of 20% are added. The mixture is heated to 60° C.

in a closed vessel in which a pressure of 5 atmospheres is maintained. In this vessel the product is kept on this temperature during some hours, afterwards cooled and neutralized with bicarbonate.

Example V

Tapioca dextrine obtained in the known way by heating above 100° C. is mixed with 15% of a hydrochloric acid solution of 10% and the product is maintained during some hours on 40° C. Thereupon the product is neutralized.

Example VI

Maize starch treated with sodium hypochlorite in the known way is dried till the product contains 4% of moisture. Thereupon the product is mixed with 8% of a hydrochloric acid solution in water of 10%. This mixture is kept at 45° C. during about 10 hours and afterwards neutralized.

Example VII

The acidulated flour described in example II is allowed to absorb dry hydrochloric acid gas before heating and thereupon the mixture is treated as described in example II.

As to my process described above it can be stated in general that in order to attain the same degree of dextrinizing and when using a small proportion of acid the neutralized flour must be kept during a longer period on a given temperature than when using a larger proportion of acid. When using the same time and the same temperature a more dextrinized product will be obtained when using more acid. When using more acid during 24 hours at a temperature of 35° C. a noticeably converted dextrine will be obtained and—if a higher temperature is preferred—it is necessary to heat only shortly, shorter than when relatively little acid is used, e. g. 0,5% calculated on the weight of the flour. In case the moisture content of the acidulated flour is higher than that corresponding with the air-dry state of the product to be prepared therefrom in connection with the evaporation it is possible to heat to a higher temperature than in case the moisture content of the acidulated raw material is lower.

Further it is remarked that the evaporation of water during the heating is also dependent on the thickness of the layer which is heated and whether the material is agitated or not. At the same temperature and when a thick layer of not agitated flour, e. g. in a silo, is used less water will be evaporated than is the case when using a thin layer of flour which is agitated. In such cases where evaporation is to be limited I prefer to use thick layers.

If during the gentle heating some drying out, e. g. 2–5% might occur then it is advisable to add some moisture e. g. by atomizing water or by introducing moist air. Adding moisture during dextrination is not only of importance for obtaining a final product with a sufficient moisture content but also to influence the dextrinizing process. In the presence of a small proportion of moisture my process is slower and goes on in a different way than in the presence of sufficient moisture.

The products obtained according to my invention possess at least the same possibilities of use as those obtained according to known processes. In several respects my products are even better, e. g. as far as colour is concerned. The salt formed by the neutralization is no drawback in most cases, and may be even of advantage as the product obtained will less stick together and will less give raise to the formation of lumps.

MEINDERT D. ROZENBROEK.