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PROCESSING OF WOOD SUGAR SOLUTION

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This invention relates to the processing of wood sugar solution and particularly to a method for the purification of wood sugar solutions.

Wood sugar solutions of the kind occurring in large quantities in the saccharification of cellulose by hydrolysis with dilute acids, besides simple kinds of sugar also contain considerable proportions of undesirable admixtures which are detrimental for some purposes, for instance, where baking yeast is to be produced from wood sugar, or where wood sugar is to be used as an animal foodstuff or as an initial product for the production of crystallised dextrose.

It is an important object of the present invention to provide a method which in a simple manner permits separation of said admixtures from the wort to a degree of purity sufficient for the said purposes, which was not hitherto possible.

I have now found that after thickening of the wood sugar solution, for instance, to a specific gravity of 1.35, and after letting stand the substance for a period of several hours, at temperatures above 60° C., approximately, and extensive resinification of the undesirable admixtures takes place. Vacuum may be used for thickening the solution, if desired.

The separation products may be removed from the sugar solution by centrifuging, filtering, clarifying or by decantation. By way of alternative, said treatments may be used in combination. Since the resinous separations partly are agglomerated, they may also be removed by sieving, i. e., by clearing.

The resinification may be carried out at temperatures below or above 100° C., but a temperature range of 90 to 100° C. will be preferable since below 80° C. the process proceeds very much more slowly, while the application of considerably higher temperatures would require the use of pressure vessels without offering substantial advantages. Preferably the process is carried out in the vicinity of the neutral point or in a slightly acid agent.

It is of special importance for the process of resinifications that an optimum specific gravity is maintained. I have found that the resinification proceeds very well at a specific gravity of S=1.3 to 1.4. It is desirable to ascertain the optimum specific gravity for each raw material by preliminary tests.

The heat treatment is carried through for several hours, preferably under stirring, the actual length of time for this treatment depending on the initial product the desired degree of purity. After the wort has been heat-treated for several hours, the same is suitably cooled down to a temperature below 50° and let stand for several hours, whereby the separation and removal of the resinous products is promoted.

My novel method primarily relates to the treatment of wood sugar worts produced after the percolation method from leaf wood or coniferous trees, but sugar worts made from other cellulose-containing substances may also be purified after my novel process. My process is adapted especially also for the refining of the various percolation fractions obtained according to the process described in my U. S. Patent No. 2,188,193, in which the first fractions are separated and used for the production of pentoses, while the later fractions of the percolation process serve for the manufacture of crystallised dextrose. My novel method may be used in any of these and similar cases. One or more fractions of the wood sugar solution, if desired or required the later fractions, containing about the second half of the yield of reducing sugar, may be treated separately. For instance, by evaporation and crystallisation of the later fractions, without application of my purifying method, a crystallised product has been obtained containing about 90 parts by weight of dextrose in 100 parts dry substance, while in a comparative test, starting from solutions subjected to a preliminary treatment according to the present invention, a product containing 98 to 99 percent glucose per 100 parts by weight has been obtained already in the first crystallisation, after centrifuging in known manner. The crystallisation may be carried out according to the methods known in the art for glucose.

In order to facilitate the separation of the resinous products from the solution by means of centrifuging, filtering, clearing or decanting, a certain amount of water is advantageously added thereto. The separation may be facilitated considerably already by a reduction of the specific gravity by dilution to a figure of 1.28 to 1.30.

The removal of the deposit or precipitate may take place immediately upon addition of the water. Upon removal of the precipitates the clear solution is suitably concentrated again so as to meet the purpose for which it is intended.

The separation products are soluble entirely or partly in alkalis, ketones, alcohols, and in furfurol, and may be used for the production of varnishes or lacquers and mordants, either alone or admixed with shellac. The wood sugar solutions thus purified and thickened are adapted not only for the production of crystallised dextrose but

also for the production of baking yeast and for use as animal foodstuff, or as a constituent for mixed animal foodstuff, resp. The mother liquors occurring in the crystallising process—after repeating the above described purifying process, if desired—may also be used for the manufacture of baking yeast or as an animal foodstuff.

Example

The later fractions of a percolation process containing about one-half of the total amount of sugar after being neutralised by means of ground limestone are evaporated under vacuum to a specific gravity of 1.34, and then maintained, for a period of about eight hours, at a temperature of 90 to 100° C., under stirring, this resulting in the separation of resinous masses. After eight hours' treatment the solution is cooled down and let stand for several hours, whereupon the specific gravity is adjusted to S=1.28 by addition of water. Then the resinous masses are removed from the solution, by centrifuging in solid jacket centrifugal machines.

The resinous masses are subsequently washed by means of water and dried. The yield of resinous products amounts to about 5 to 10 percent by weight of the total dry substance of the sugar solution.

The purified sugar solution then is boiled down under vacuum to a specific gravity of 1.35 to 1.40, and preferably 1.39. The solution thus processed may be crystallised according to the methods known in the art for starch sugar.

The method of the present invention has been described in detail with reference to specific embodiments. It is to be understood, however, that the invention is not limited by such specific reference but is broader in scope and capable of other embodiments than those specifically described.

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