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PROCESS FOR PREPARING NON-FERMENTABLE SUGAR SUBSTITUTE AND PRODUCT THEREOF

Ernst Conrad, Lyckeby, Sweden, assignor to Lyckeby Starkelseforadling Aktiebolag, Lyckeby, Sweden, a corporation of Sweden

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18 Claims

Matter enclosed in heavy brackets [] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

ABSTRACT OF THE DISCLOSURE

Sugar substitute prepared by hydrogenating a saccharified starch having a dextrose equivalent of 15-75% and containing dextrines until substantially no dextrose and maltose remain.

As a substitute for sugar other sugar-like and sweetly tasting products are used to a great extent, great importance in most cases being placed thereon that the sugar-like products are not fermentable and do not yield acid decomposition products, e.g. lactic acid, by the action of microorganisms. Such acid products are regarded to primarily cause caries in teeth in cases of high consumption of sugar-containing products, such as candies, confectionary and other sweet products.

The so-called sugar alcohols, especially sorbitol, belong to the most commonly used sugar-like products, which are manufactured industrially. As a starting material it is possible to use such polysaccharides, especially starch, which on saccharification mainly give dextrose. The dextrose is then hydrogenated in the presence of a suitable catalyst. The saccharification of the polysaccharide used as a starting material, e.g. starch, is made either by acid hydrolysis or enzymatically. Previously it was regarded as suitable to perform the saccharification as far as possible and the known processes were carried out so that the dextrose content of the material subjected to saccharification had a dextrose equivalent value of about 90%. In many cases such dextroses were directly hydrogenated to sorbitol after purification in a manner known per se. The 10% of carbohydrates remaining in the dextrose solution consisted principally of so-called water-soluble dextrines. These water-soluble dextrines were regarded as undesirable and detrimental to the quality of the sorbitol obtained and for this reason the dextrose solution obtained by saccharification was usually treated by evaporation and recrystallization for the removal of the water-soluble dextrines.

When hydrogenating a dextrose solution obtained in the known manner, which at most contained 10% of other carbohydrates other than dextrose, a sorbitol syrup was obtained which was strongly hygroscopic. This prop-

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erty of the sorbitol syrup can be utilized in many cases for the prevention of drying. An addition of 10% of sorbitol is usually satisfactory for considerably delaying the moisture losses and the drying-out.

By the addition of alcohol or by freezing the sorbitol can be recovered from the sorbitol syrup in the form of a white finely crystalline powder which after drying can be compressed to solid products.

When the sorbitol syrup is evaporated to dryness a candy-like semi-solid mass is obtained which, however, during storage rapidly takes up moisture from the air and reverts to the liquid form. This can only be prevented by the addition of large amounts of foreign, drying substances.

As has been mentioned above, it has already been tried to use sorbitol in the manufacture of candies, confectionary and other sweet products on account of its similarity to sugar, particularly because of its sweet taste and its failure to ferment which prevents the formation of acid caries-causing products. The hygroscopic property of sorbitol is, however, a great drawback. A further disadvantage of sorbitol is its actual but relatively weak laxative action.

The product obtained according to the present invention by the saccharification of polysaccharides giving dextrose and maltose has considerable advantages above the mentioned products containing about 90% sorbitol, particularly in that it is at the most weakly hygroscopic. Furthermore, the new product shows no or only a very weak laxative effect. The solution obtained by hydrogenation does not crystallize even on extensive cooling and can be evaporated to a solid and moldable mass, which retains its structure for an unlimited period of time even in very damp atmospheres. The new product also has the advantage of sorbitol with a view to its sugar-like character and the absence of fermentability induced by the commonly present fermentation microorganisms. As compared to sorbitol it has also the great advantage of being at the most weakly hygroscopic.

Contrary to the processes according to the prior art the polysaccharide starting material, particularly starch, is not, according to the invention, subjected to saccharification as far as possible but only to a dextrose equivalent value of 15-75%. The remaining part of the polysaccharide, which is not converted into dextrose and maltose, also in the case of the invention consists of water-soluble dextrines and by establishing a certain dextrose and maltose content between a dextrose equivalent value of 15 and 75%, the properties of the product obtained on hydrogenation, especially the remaining hygroscopicity and the laxative effect, can be varied to a large extent. The use of sorbitol prepared according to the known processes very often necessitates the use of fillers, especially fillers of a gum arabic nature, but this is not necessary with the use of the product according to the invention.

The hydrogenation of the polysaccharide which has been subjected to saccharification to a dextrose equivalent value of 15-75% can be made after or, if so desired, also simultaneously with the saccharification of the polysaccharide used as the starting material. As has already been stated above the usable starting materials include preferably starch but cellulose can also be used, since cellulose gives dextrose on saccharification.