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PULPY TEXTURED FOOD SYSTEMS CONTAINING INHIBITED STARCHES

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ABSTRACT OF THE DISCLOSURE

Preparation of starch containing food products exhibiting a grainy, pulpy texture, by admixing the non-starch ingredients of said food product with a gelatinized, amylose containing starch product which has been inhibited by reaction with a cross-linking agent and pulverized to within a certain particle size range and thereafter heating the resulting mixture at a temperature of at least about 160° F. so as to effect the swelling of the starch particles therein.

This invention relates to a method for the preparation of starch containing food products exhibiting grainy, pulpy textures and, more particularly, to the starch systems utilized therein.

The appearance and overall consumer appeal of many processed food products is greatly enhanced when they are characterized by the presence of a pulpy texture. Such food products thus appear to retain much of their natural texture and, in so doing, exhibit a rich, highly concentrated appearance as opposed to the thick, pasty character which often results from the use of conventional starch thickeners. In addition, the presence of a pulpy texture is often accompanied by other improved properties of color and taste.

Various attempts have been made to impart this desirable pulpy texture to starch containing food products. One such method has involved the incorporation of cracker meal. However, the result of the latter technique is merely to disperse white flecks of cracker particles within the system while failing to impart either a good grain or a pulpy appearance to the resulting food product. In addition, the presence of the cracker meal detracts from the natural color of the food product. Another method, which is primarily used in baby foods, involves the incorporation of tapioca pearls therein. In this case, the extreme clarity and fragility of the pearls severely hamper the formation of a desirable pulpy texture within the food product.

It is the prime object of this invention to provide starch containing food systems with a grainy, pulpy texture. It is a further object to provide the latter characteristics via the use of starch products which exhibit an appropriate particle size and which will, more particularly, produce particles that remain intact both during and after additional processing of the resulting food product. Various other objects and advantages of this invention will become apparent to the practitioner from the following detailed description thereof.

We have now found that starch containing food products exhibiting a highly desirable grainy, pulpy texture can be readily prepared by incorporating pregelatinized, crosslinked, amylose-containing starch products into food systems, prior to the cooking and sterilization thereof. We

have further found that the latter starch products are ideally suited for such usage by virtue of the fact that they are able to exhibit sufficient cold water swelling ability so that upon being cooked they will produce swollen, discrete particles having an appropriate particle size along with excellent resistance to heat, acidity, and agitation which will permit these swollen particles to remain intact during any subsequent processing operations.

As previously noted, the starch products which may be used in the novel process of this invention comprise pregelatinized, crosslinked, amylose-containing starches. The applicable starch bases which may be used in preparing these starch products may be derived from such plant sources as corn, potato, sweet potato, wheat, rice, sago, tapioca, sorghum or the like as well as the high amylose containing varieties of these sources. Also included are the conversion products derived from any of the latter bases including, for example, dextrines prepared by the hydrolytic action of acid and/or heat; oxidized starches prepared by treatment with oxidants such as sodium hypochlorite; and, fluidity or thin boiling starches prepared by enzyme conversion or by mild acid hydrolysis. In addition, the amylose fraction derived from any of the above noted starch bases may also be utilized. It is also possible to employ any substituted ether or ester derivative of these starch bases or their amylose fractions.

In order to inhibit, i.e. to crosslink, any of the latter starch bases, it is ordinarily necessary to react the starch with a crosslinking agent. These include: aliphatic dihalides such as propylene dichloride, dichloropentane, ethylene dibromide, glycerol dichlorohydrin and a dichlorobutane; ether forming epoxy halogen compounds such as epichlorohydrin and epibromohydrin; certain polyfunctional reagents such as cyanuric chloride, phosphorus oxychloride, metaphosphates and polymetaphosphates; aldehydes such as formaldehyde and formaldehyde containing resins and prepolymers; succinic anhydride; and, mixtures of adipic or citric acid with acetic anhydride. In general, these cross linking agents may be defined as compounds containing at least two functional groups which can react with at least two available hydroxy groups of the starch molecule or molecules and thus alter the cooking characteristics of the resulting starch product.

With respect to the actual preparation of these inhibited starches, we refer to a number of U.S. patents relating to various inhibition processes. These include: U.S. 2,500,950, which covers the use of dihalides and epoxy halogen compounds; U.S. 2,805,220, which covers the use of cyanuric chloride; U.S. 2,801,242, which covers the use of mixtures of meta and polymetaphosphates; U.S. 2,471,139, which covers the use of succinic anhydride as well as mixtures of adipic or citric acid with acetic anhydride; and, U.S. 2,328,537, which covers the use of phosphorous oxychloride.

Furthermore, with respect to the amount of crosslinking reagent needed for the reaction, this is determined by the granule swelling power (GSP) of the resulting crosslinked starch. Granule swelling power is a measure of the extent of granule inhibition, and may be defined as the amount of swollen, hydrated paste which is formed by the cooking, in water under specific conditions, of one gram of dry starch as divided by the weight of anhydrous starch in the swollen paste.

The GSP is determined, in practice, by dispersing one gram of starch (anhydrous weight) in enough distilled water to give a total weight of 100 grams. Normally, the