United States Patent Office 2,749,244 Patented June 5, 1956

2,749,244

METHOD OF MAKING NON-LUMPING STARCH MIXTURE AND THE RESULTING COMPOSITION

Bernard M. Winner, Whiting, Ind., assignor to American Maize-Products Company, a corporation of Maine

No Drawing. Application June 10, 1953, Serial No. 360,847

9 Claims. (Cl. 99—139)

This invention relates to a powdered food product derived from starch which has the extraordinary quality of almost instantly forming a smooth paste when mixed with cold water or other aqueous liquid.

My invention is best illustrated in connection with Amazo Instant Dessert, the commercial name for a dry powdered mix with a starch base which is made into pudding by the addition of cold water or milk. Briefly stated, this pudding mix is made with starch derived from waxy maize which has been modified by using the general method described in United States Patent No. 2,328,537 issued September 7, 1943, to Felton and Schopmeyer. The modified starch is precooked, dried and mixed with sugar and flavoring and the resulting mixture is then milled into a powder and packaged for use. The user has only to mix the dry powder with the desired amount of cold water or milk to form a paste or stiff mass suitable for use as a pudding.

It has been found that in order to make a pudding of smooth consistency it is necessry to have the material very fine, for example it may be fine enough so that approximately 94% of the dry particles pass through a 200-mesh screen. For an instant dessert which will form in a matter of seconds approximately 60% of the particles should pass through a 325-mesh screen. Unfortunately it has been found that particles of this fineness absorb liquid so quickly that it is difficult to mix the dessert without forming lumps.

I have now discovered that by treating the individual particles with a substance having hydrophilic and lipophilic characteristics it is possible to disperse the ingredients homogeneously in a liquid in about 30 seconds without forming lumps. The general class of materials which I have used in the practice of my invention are the mono fatty acid esters of polyethylene glycol which have a melting point within the range of 45° F. to 140° F. and have molecules in which a portion of each molecule is hydrophilic or water-loving, and another portion is lipophilic or oil-loving.

More specifically, the hydrophilic characteristics of the material must be equal to or predominate over the lipophilic characteristics. This is an essential feature of my invention which makes it possible to achieve a smooth pudding in about 30 seconds without forming lumps. On the other hand, if the lipophilic characteristics of the material predominate to any appreciable extent over the hydrophilic characteristics then hydration of the particles occurs before they are dispersed in the liquid and this results in lumps and the pudding is not satisfactory for commercial use. The desired hydrophilic-lipophilic balance may be obtained by selecting a polyoxyethylene ester in which the glycol portion of the molecule has a molecular weight from about 400 to about 4,000 and the fatty acid portion from about 12 to about 18 carbon atoms. Examples of such materials include polyoxyethylene glycol monolaurate, polyoxyethylene glycol monopalmitate, polyoxyethylene glycol mono-oleate and polyoxyethylene monostearate.

These materials are all readily obtainable on the open market. The amount of reagent employed is between 0.1% and 8.0% based on the weight of solid material in the dry pudding mix and is preferably between 0.1% and 6.0%.

The reagent may be added to the dry pudding mix in any number of ways but the important thing is to add it before the mix is finally milled for packaging. This insures thorough mixing because the heat generated during the milling operation melts and increases the fluidity of the reagent and tends to distribute it more evenly among the particles. One convenient way of adding my reagent is to simply spray it on the material. It may be melted and sprayed as a concentrated liquid or dissolved in a suitable solvent such as ethanol and then sprayed on the material. If a solvent is used, it must be evaporated from the material before packaging and in either case the material should be milled after the reagent is added.

I do not know whether my reagents react chemically with the starch or merely form a coating on the surface of the granule but I believe that my reagents impart their hydrophilic and lipophilic characteristics to the starch granules changing their capacity to absorb water and mix with liquids so that the granules in my pudding mix may be homogeneously dispersed in a liquid medium in about 30 seconds without forming lumps. In laboratory experiments, when treated dry powder is sprinkled on water, the particles tend to separate and absorb water individually whereas particles of the same powder which have not been treated form lumps or aggregates. When equal amounts of powder are suspended in water the sedimentation volume of the untreated material is at first considerably greater than that of the treated material. The untreated particles settle as aggregates in contrast to the treated particles which settle individually. On standing the sediment in each case is exactly the same. It is to be noted that my reagent momentarily retards hydration of the dry particles and in so doing its effect is exactly the reverse of a wetting agent which would lower the liquid surface tension on the material and tend to give instant hydration. However the hydrophilic characteristics of my reagents prevent the starch particles from becoming predominantly hydrophobic so that retardation of wetting is only momentary.

For the purpose of illustration and in order to point out the best method now known to me of carrying out my invention, the following examples are given:

Amioca, the generic name for starch derived from waxy maize, was modified according to the process described by Felton and Schopmeyer and then made up into a slurry with carefully purified water. After it was thoroughly mixed, the slurry was pumped through a continuous steam-heated cooker and precooked for about a minute at a temperature of 160° to 212° F. The slurry was fed over a hot roll heated with steam at 160 pounds pressure to dry the starch which was then pulverized to a powder for blending.

A dry chocolate pudding mix was made by blending 25 parts of this starch in a ribbon mixer with 35 parts of cane or beet sugar, 20 parts of corn sugar, 17.5 parts of cocoa, 1.1 parts of salt and 0.4 part of vanilla flavoring. 1.0 part of polyoxyethylene glycol mono-oleate was sprayed on the blend and it was then milled in a ball mill or the like until practically all of it passed through a 200-mesh screen. Four ounces of the resulting dry pudding mix was added to a pint of milk and the two beaten together with a rotary egg beater until a stiff paste or pudding was formed. The paste formed in about 30 seconds and had a smooth consistency that was absolutely lump-free.

The above procedure was followed with the following ingredients:

25 parts starch
35 parts cane or beet sugar
20 parts corn sugar
17.5 parts cocoa
1.1 parts salt
2.0 parts polyoxyethylene glycol mono-palmitate

A vanilla pudding was made with the following ingredients:

33.0 parts starch
35.0 parts corn sugar
30.0 parts sucrose, beet or cane sugar
1.11 parts salt
0.35 part vanilla flavoring
0.01 part food coloring
0.2 part polyoxyethylene glycol monostearate

The polyoxyethylene glycol monostearate was melted, poured on the sucrose and these two were mixed to form a homogeneous material which was then blended with the other ingredients and the whole was milled until all of it passed through a 200-mesh screen. This powder was mixed with milk as above described, with the same results.

A butterscotch dessert was made as follows:

33.0 parts starch
34.0 parts corn sugar
29.0 parts sucrose, beet or cane sugar
2.5 parts salt
0.3 part butterscoth flavoring
0.1 part food coloring
1.1 parts polyoxyethylene glycol monolaurate.

The liquid polyoxyethylene was mixed with the sugar, salt and flavoring to form a homogeneous material which was then blended with the other ingredients and the whole was milled until practically all of it passed through a 200-mesh screen and approximately 60% of it through a 325-mesh screen. This powder was mixed with milk as above described, with like results.

A chocolate dessert was made as follows:

30 parts starch
29 parts corn sugar
33 parts cane or beet sugar
18 parts cocoa
1.1 parts salt
6.0 parts polyoxyethylene glycol monopalmitate

The polyoxyethylene was sprayed on the cane sugar and these two were mixed to form a homogeneous material which was then blended with the other ingredients and the whole was milled until all of it passed through a 200-mesh screen and 60% of it through a 325-mesh screen. This powder was mixed with milk as described above and a paste formed in about 30 seconds which had a smooth consistency absolutely free of lumps.

In all of the examples given above the glycol portion of the polyoxyethylene material had a molecular weight between 400 and 4,000 and the fatty acid portion of the material contained between 12 to 18 carbon atoms.

Although I have illustrated my invention in connection with a modified starch derived from waxy maize it will be understood that the starch need not be modified and may be derived from rice, arrowroot, tapioca and the like.

It will be also understood that the examples are merely intended to give specific illustrations of the way my invention can be carried out and are not intended to imply any limitations on the variations that may be employed.

What I claim is:

1. The method of making an improved powdered starch material which comprises mixing the material with a minor proportion of a reagent having molecules with both hydrophilic and lipophilic characteristics in which the hydrophilic characteristics are at least equal to the lipophilic, said reagent being selected from the group consisting of polyoxyethylene glycol monolaurate, polyoxyethylene glycol mono-oleate, polyoxyethylene glycol monopalmitate and polyoxyethylene glycol monostearate, the resulting material being characterized by the fact that the particles of powdered starch may be homogeneously dispersed in a liquid in about 30 seconds to form a smooth pudding like paste or stiff mass.

2. The method of claim 1 in which the amount of reagent used is within the range of 0.1% to 8.0% by weight of the powdered material.

3. The method of claim 1 in which the reagent has a melting point within the range of 45° F. to 140° F.

4. The method of making an improved powdered starch material which comprises adding to the powdered material a minor proportion of a reagent having molecules with both hydrophilic and lipophilic characteristics in which the hydrophilic characteristics are at least equal to the lipophilic, said reagent being selected from the group consisting of polyoxyethylene glycol monolaurate, polyoxyethylene glycol mono-oleate, polyoxyethylene glycol monopalmitate and polyoxyethylene glycol monostearate, and then milling the resulting mixture until the particles are small enough to pass through a 200-mesh screen whereby said particles are coated with the reagent to give particles which may be homogeneously dispersed in aqueous liquids in about 30 seconds to form a smooth paste or stiff mass suitable for use as a pudding.

5. A dry pulverulent composition of matter comprising a mixture of starch, sweetening, salt and flavoring agents having particles coated with a reagent having molecules with both hydrophilic and lipophilic characteristics in which the hydrophilic characteristics are at least equal to the lipophilic, said reagent being selected from the group consisting of polyoxyethylene glycol monolaurate, polyoxyethylene glycol mono-oleate, polyoxyethylene glycol monopalmitate and polyoxyethylene glycol monostearate and characterized by the fact that the particles may be homogeneously dispersed in aqueous liquids in about 30 seconds to form a smooth paste or stiff mass suitable for use as a pudding.

6. A dry pulverulent composition of matter as specified in claim 5 having particles 94% of which will pass through a 200-mesh screen and 60% of which will pass through a 325-mesh screen.

7. A composition of matter as specified in claim 5 in which the particles are coated with between 0.1% and 8.0% of reagent by weight of the solid material in the mass.

8. An improved starch material comprising a mixture of powdered starch and a minor proportion of a reagent having molecules with both hydrophilic and lipophilic characteristics in which the hydrophilic characteristics are at least equal to the lipophilic, said reagent being selected from the group consisting of polyoxyethylene glycol monolaurate, polyoxyethylene glycol mono-oleate, polyoxyethylene glycol monopalmitate and polyoxyethylene glycol monostearate and characterized by the fact that the particles may be homogeneously dispersed in aqueous liquids in about 30 seconds to form a smooth paste or stiff mass suitable for use as a pudding.

9. The method of claim 1 in which the polyoxyethylene glycol portion of the molecules of reagent have a molecular weight from about 400 to about 4000 and the fatty acid portion of the molecules contain from 12 to 18 carbon atoms.

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