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NON-CAKING GELATIN COMPOSITION AND METHOD OF PREPARING THE SAME

Emery Polya, Tarrytown, Eugene C. Zawoy, Forest Hills, Oscar R. Friedemann, Yonkers, and Noel I. Lemack, Tarrytown, N.Y., assignors to General Foods Corporation, White Plains, N.Y., a corporation of Delaware

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This invention relates to a composition particularly characterized by its non-caking properties. More particularly it relates to a gelatin composition adapted to be used as a dessert, and particularly characterized by its non-caking properties.

As is well known to those skilled-in-the-art, gelation desserts as heretofore commonly prepared, may contain gelatin sugar, flavor, color, etc. Most commonly these desserts also contains acids or buffer material to adjust the taste, tartness, and pH. Although salts may commonly be employed as buffer materials, it is found that the desired results may be obtained by use of certain acids.

Formation of a gelatin dessert includes adding the several ingredients to a mixer, and mixing or blending to obtain a uniformly homogeneous mixture which may then be packaged for distribution.

Although gelatin dessert compositions prepared in this manner have generally been found to be satisfactory, they possess certain defects. The shelf life or storage life (i.e., the average time during which the composition will remain free-flowing under normal handling and storage conditions) of a typical gelatin dessert composition may vary depending upon the degree of packaging and the particular conditions of temperature, humidity, etc., which may prevail within the package and in the environment outside the package. Commonly the shelf life of a properly packaged gelatin dessert composition might be of the order of one year under conditions which prevail in a temperate, non-humid area. It is found that the product within the package will cake if these gelatin compositions are stored for periods of time in excess of the normal shelf life. When caking occurs, the mass may coalesce, fuse, or solidify to form are more-or-less monolithic block of material. Although the so-caked material may be satisfactory with respect to most of its properties, including, e.g., pH, tartness, etc., it is difficult to handle. Solution of the caked composition occurs at an extremely slow rate and may take a disproportionately long period of time.

Storage of dessert compositions in warehouse quantities or in packages larger than those employed by the consumer is not uncommon. Caking of these larger quantities of dessert composition makes it necessary to break up the cake for the purpose of handling it and for filling smaller packages if desired.

Although the causes of caking are not completely known, it appears that caking may result from the presence of water which, e.g., may arise from leakage into the package of moisture under undesirable conditions; or it may also result from a redistribution of moisture already present within the package—arising, for example, from the gelatin which, as commonly handle, may contain 8%–12% water. In any event, regardless of the reason for caking or the source of whatever water may be necessary to effect the undesirable caking, it appears that there may be a re-solution and reprecipitation of soluble components within the mass, with the result that the crystals of the various materials coalesce or join together to form a rigid mass.

It has long been recognized that caking of these compositions is highly undesirable. Heretofore attempts have been made to eliminate caking. Among these techniques

which have been attempted in order to minimize or eliminate caking, may be noted the treatment or pretreatment of the various individual ingredients, typically the gelatin or acid which form the gelatin dessert; commonly, for example, the gelatin has been screened to optimum particle size at which minimum caking occurs. The elimination or modification of various components of the mixture has been attempted—for example, elimination of buffer materials or the use of buffer materials other than those heretofore employed. Attempts have been made to add various anticaking agents to gelatin dessert compositions.

It is well known, however, that none of these prior attempts to solve the problem of caking has been completely successful. The addition of anti-caking agents has introduced other problems which raise additional questions, including toxicity, etc. The elimination of buffer salts may result in gelatin dessert compositions which may not possess the desired pH or tartness. The substitution of one buffer material for another may interfere with desired pH, tartness, and gel formation. Accordingly, as is well known to those skilled-in-the-art, there appears to be no completely satisfactory technique for eliminating caking of gelatin dessert compositions; and the industry has necessarily adopted as the practical shelf life a period of time which is generally believed to be undesirably short. In other words, product compositions which may be satisfactory in all other respects have been considered undesirable merely because after the end of the so-called shelf life they were unsatisfactory from the point of view of caking.

It is an object of this invention to set forth a technique for preparing a gelatin composition characterized by its freedom from caking. Other objects will be apparent to those skilled-in-the-art on inspection of the following description.

In accordance with certain of its aspects, the process of this invention for preparing a gelatin composition particularly characterized by its non-caking properties, comprises mixing gelatin and adipic acid in aqueous solution and drying said mixture to form a composition containing fixed gelatin and adipic acid.

Gelatin, as the term is used herein, includes any of the gelatins commonly employed in the food industry, including those used in the preparation of gelatin desserts. Such a gelatin may be an acid or a lime gelatin and may commonly have a Bloom of 100–285, typically 200; a viscosity of 20–65, typically 35 millipoises; and, in dry form, a moisture content of typically 8%–12%. Commonly such as gelatin as delivered to a dessert-formulating plant may have a more or less uniform particle size such that 100% will pass through 40-mesh (U.S. standard) screen, and 20% will pass through 100-mesh screen.

Adipic acid, as the term is used herein, includes the adipic acid of commerce which may be a whitish, crystalline material commonly having a purity approaching 100%.

In practice of this invention, fixing of adipic acid and gelatin will preferably be effected by mixing the gelatin and the adipic acid in aqueous solution. Preferably 2–20, say 5.3 parts by weight of gelatin may be mixed with one part by weight of adipic acid in aqueous solution. As hereinafter noted, the quantity of water which may be employed in practice of this invention may be at least sufficient to dissolve the gelatin and adipic acid and sufficiently low to permit gelation of the solution. Typically this amount will be sufficient to form a solution having a concentration of at least about 20%–30%, say 25%.

It is a feature of this invention in the preferred embodiment, that the desired results may be attained by forming a common aqueous solution of gelatin and adipic acid. This may be effected by adding either the gelatin or the adipic acid, either simultaneously or consecutively, to

water to form a solution. If desired, either the charge gelatin or the charge adipic acid or both, to be employed, may be used in the form of a solution.

When one of the components to be mixed in the mixture is added thereto in solid form, as for example when the treatment is to be effected by mixing solid gelatin with a solution of adipic acid, or when the treatment is to be effected by mixing solid adipic acid with a solution of gelatin, sufficient heating is preferably provided to effect complete solution of the solid component. In the preferred embodiment, all the gelatin will be in solution. Heating may be effected by addition of warm solution or by externally heating the mixture. It may, for example, be effected by adding warm solution to the solid mixture.

Preferably the heating will be sufficient to raise the mixture to a temperature sufficiently high above the so-called melting point of the gelatin to effect solution of the gelatin. Typically the solution may be heated to 140° F.–212° F., say 140° F. The melting point of gelatin, as is well known, is the temperature at which the first portion becomes liquified. Although it is understood that this is not a melting point in the strict sense of the word, but rather a solution point, the term melting point is commonly employed.

The solution of gelatin and adipic acid may then be dried. Preferably the mixture is cooled prior to drying and cooling may be effected to a temperature of 40–50° F., preferably 50° F., at which point the mixture may be in a solid, gelled mass. The so-cooled blocks or sheets of the mixture of gelatin and adipic acid may then be placed in drying racks and passed to a tunnel drying operation. Here the material may be subjected to contact with air at temperature of preferably 70° F.–110° F. for a period of several hours, typically 30–50 hours, say 36 hours, until the moisture content is lowered to about 8%–12%, say 10%.

The so-dried product contains fixed gelatin and adipic acid. Fixing includes the formation of a crystal mass within which the gelatin and adipic acid may be uniformly mixed. Although it is not certain what happens during the fixing, it appears that the co-crystallized adipic acid and gelatin may form a composition which does not cake and which is particularly free of caking when this composition is included in a gelatin dessert.

The so-dried material may then be ground to desired particle size, typically about 60-mesh, and further mixed with other desired components to form a gelatin dessert. Typical of the materials which may be added per 100 parts of dessert composition, may be noted the following:

Component	Parts by Weight		
	Min.	Max.	Preferred
Gelatin-Adipic Acid	10	14	12
Sugar	82	88	85
Buffer-Sodium Citrate	0.5	1.5	1.0
Flavor	0.2	0.6	0.4
Color	0.2	0.6	0.4

The total amount of adipic acid employed may be determined by the pH and tartness of the composition. It is a particular feature of this invention that the improvement in the anti-caking properties may be effected by fixing, in the manner described, all or less than all of the acid required by the pH and tartness requirements. It will be apparent that the total amount of adipic acid (shown in the table together with the gelatin) may be derived from both fixed and unfixed adipic acid. More specifically, it is preferred that the fixed adipic acid may be present in amount ranging from as low as about 40% and as high as 60%–80%, preferably 65% of the total adipic acid. The remaining portion of the acid may be present in unfixed form—i.e., added in dry form to the composition.

To illustrate, a series of experiments was run in which

3.5 parts of gelatin was combined with 1.0 part (fixed and unfixed) of adipic acid. It was found, after 4 weeks of accelerated storage at 90° F. and 85% R.H., that a composition having 65% of the acid in fixed form and 35% in unfixed form was superior with respect to caking than were products having 100% of the acid fixed, 35% of the acid fixed, and 0% of the acid fixed.

Practice of this invention will be apparent from the following examples. In each case, a gelatin dessert composition was made up and tested by placing a package (a waxed paper inner liner within a cardboard box) thereof in an environment at 90° F. and 85% R.H. The samples were tested at the end of each week for 12 weeks.

Example I

In accordance with a specific Example of this invention, 5.3 parts of gelatin was dissolved in 19 parts of water to which was added 1.0 part by weight of adipic acid. This mixture was heated to 140° F. to form a homogeneous solution, the acid and gelatin having dissolved. The solution was cooled to 50° F. at which point a gel was formed. The gel was dried by contact with air at room temperature for 36 hours. The dry material had a moisture content of about 10%.

The so-dried material was then ground to approximately 60-mesh particle size. 0.5 part by weight of dry adipic acid was then added to this mixture.

A gelatin dessert composition was formed by adding 33 parts of this mixture to 216 parts of sugar, 1 part of color, 1 part of flavor, and 2.25 parts of sodium citrate buffer.

Example II

In this example a gelatin dessert composition was prepared in manner identical to Example I, except that all of the adipic acid (1.5 parts) was added to and dissolved in the gelatin solution.

Example III

In this example the procedure of Example I was followed, except that none of the adipic acid was dissolved in the gel solution; all of the adipic acid (1.5 parts) was added in dry form to the gelled, dried, and ground gelatin.

Example IV

In this example, which indicates use of a typical prior art acid, Example II was duplicated, except that 1.5 parts of citric acid were used instead of adipic acid.

Example V

In this example which indicates use of another typical prior art acid, Example II was duplicated, except that 1.1 parts of fumaric acid were used instead of adipic acid.

Example VI

In this example the procedure of Example III was followed, except that 1.1 parts of fumaric acid was used in place of the 1.5 parts of adipic acid.

At the end of the comparative caking tests after 12 weeks, each of the gelatin dessert compositions was inspected. It was found that the products prepared in accordance with this invention, as noted in Examples I and II, were substantially free of caking. The product of Example I, wherein approximately ⅔ of the acid was fixed and ⅓ was unfixed, was superior to the product of Example II wherein all of the acid was fixed. Example III was found to be caked to a substantially greater degree than the compositions of Examples I and II. The compositions of Example IV containing citric acid, and Examples V and VI containing fumaric acid were found to have caked to a considerably greater degree than any of the compositions of Examples I, II, and III. During the course of the tests, it was noted that the compositions of Examples III, IV, V, and VI were substantially caked after only 3 weeks, whereas the compositions of Examples I and II were substantially uncaked at the end of 12 weeks.

It will be apparent to those skilled-in-the-art that the fixed gelatin-adipic acid composition which is particularly characterized by its non-caking property may be employed in any of a wide variety of compositions wherein gelatin and adipic acid are desired, e.g., in dessert compositions, in beverage compositions, etc.

Although this invention has been described with reference to certain examples, it will be apparent to those skilled-in-the-art that various changes and modifications may be made thereto which fall within the scope of this invention.

What is claimed is:

1. A gelatin-containing composition particularly characterized by its non-caking properties, comprising dry, crystalline particles containing adipic acid fixed in gelatin, said particles containing by weight 2 to 20 parts of gelatin per part of acid.

2. A gelatin-containing composition particularly characterized by its non-caking properties, comprising dry, crystalline particles containing adipic acid fixed in gelatin and particles of adipic acid, said particles of adipic acid fixed in gelatin containing by weight 2 to 20 parts of gelatin per part of acid.

3. A gelatin-containing composition as claimed in claim 2, wherein 40%–80% of the total quantity of adipic acid in said composition is in said particles containing adipic acid fixed in gelatin.

4. A gelatin-containing composition as claimed in claim 4 wherein about 65% of the total quantity of adipic acid in said composition is in said particles containing adipic acid fixed in gelatin.

5. A gelatin dessert composition particularly characterized by its non-caking properties, comprising dry, crystalline particles containing adipic acid fixed in gelatin and particles of saccharine material, said particles of adipic acid fixed in gelatin containing by weight 2 to 20 parts of gelatin per part of acid.

6. A gelatin dessert composition particularly characterized by its non-caking properties, comprising dry, crystalline particles of adipic acid fixed in gelatin, particles of adipic acid, and particles of saccharine material, said particles of adipic acid fixed in gelatin containing by weight 2 to 20 parts of gelatin per part of acid.

7. The method of preparing a gelatin composition particularly characterized by its non-caking properties, which comprises forming an aqueous solution of gelatin and adipic acid, and drying the solution to form dry, crystalline particles having a moisture content of about 8 to 12%, said particles containing by weight 2 to 20 parts of gelatin per part of acid.

8. The method of preparing a gelatin composition particularly characterized by its non-caking properties, which comprises forming an aqueous solution of gelatin and adipic acid containing by weight 2 to 20 parts of gelatin per part of acid, the quantity of water in said solution being sufficient to dissolve the gelatin and the acid but insufficient to prevent gelling of the solution on cooling, cooling the solution to form a gel, and then drying the gel to produce dry, crystalline particles having a moisture content of about 8 to 12%.

9. The method of preparing a gelatin composition particularly characterized by its non-caking properties, which comprises mixing gelatin and adipic acid with a quantity of water sufficient to dissolve the gelatin and the acid but insufficient to prevent subsequent gelling of the solution formed, heating the mixture at a temperature of about 140° to 212° F. to effect complete solution of the gelatin and the acid in the water, cooling the solution to a temperature of about 40° to 50° F. to gel the solution, and then drying the gel to about 70° to 110° F., to form dry, crystalline particles having a moisture content of about 8 to 12%, said particles containing by weight 2 to 20 parts of gelatin per part of acid.

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