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(54) Title: COATING COMPOSITION

(57) Abrégé/Abstract:
An edible moisture barrier coating comprising from 70 to 95% of an aqueous solution of a protein isolate and 30 to 5% of a mixture of a saturated lipid and emulsifier containing an amount of emulsifier from 5 to 30% based on the weight of the lipid, the lipid having a melting point higher than 30°C and the emulsifier containing one or more diacetyl tartaric acid esters of monoglycerides.

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Abstract

Coating composition

An edible moisture barrier coating comprising from 70 to 95% of an aqueous solution of a protein isolate and 30 to 5% of a mixture of a saturated lipid and emulsifier containing an amount of emulsifier from 5 to 30% based on the weight of the lipid, the lipid having a melting point higher than 30°C and the emulsifier containing one or more diacetyl tartaric acid esters of monoglycerides.

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The present invention relates to an edible moisture barrier coating which reduces the migration of water between the components in a heterogeneous food system.

In heterogeneous food products it is difficult to prevent moisture migration from the high water content components to the lower water content components and this causes the latter to become undesirably soft and moist. Edible coatings are known to retard this moisture transfer within foods and such coatings are often emulsions prepared from various protein/fat combinations.

We have found surprisingly that by using a coating prepared from a protein/fat mixture in which the protein is a protein isolate capable of forming a film, a significantly increased level of functionality is imparted to the edible barrier coating.

Accordingly the present invention provides an edible moisture barrier coating comprising from 70 to 95% of an aqueous solution of a protein isolate capable of forming a film and 30 to 5% of a mixture of a saturated lipid and emulsifier containing an amount of emulsifier from 5 to 30% based on the weight of the lipid, the lipid having a melting point higher than 30°C and the emulsifier containing one or more diacetyl tartaric acid esters of monoglycerides.

The aqueous solution of the protein isolate preferably has a concentration of from 1 to 50% or above, preferably from 8 to 40%. Any protein isolate that is capable of forming a film may be used to form the barrier coating for example, whey protein, caseinate, egg albumin or milk protein. The protein isolate is preferably purified and the greater the purity the better will be the film forming property and hence the barrier.

United States Patent No. 4218490 describes the use of a surface active protein agent in a process for preparing edible foodstuff materials containing water wherein the surface-active protein agent contains 90% or more by weight of protein and which has been prepared by extraction from a surface-active protein source by ion-exchange interaction with an ion-exchange material followed by recovery from the ion-exchange material. The isolation of protein from protein sources by a process of ion-exchange extraction described in USP 4218490 results in a protein isolate which is usually concentrated and dried and, when the protein isolate is capable of forming a film,it may be used in this invention. It should be understood that the protein isolate of this invention may be prepared by any of the methods described in USP 4218490 and whey protein isolate thus prepared is particularly advantageous.

The average emulsion particle size of the coating may be from 5 to 30, preferably from 10 to 20 and especially from 7 to 15 microns.

The saturated lipid preferably contains fatty acid chains having from 10 to 20 and preferably from 12 to 18 carbon atoms. From an organoleptic point of view it is preferable that not more than 15 to 20% by weight of the lipids contain fatty acid chains having from 16 to 18 carbon atoms. Fats containing fatty acid chains having 12 carbon atoms are particularly desirable.

Preferably, the emulsifier contains also an acetylated monoglyceride, and/or one or more mono- or diglycerides.

The mono- and diglycerides of the emulsifier are conveniently derived from saturated fat feed stocks, preferably containing fatty acid chains having from 12 to 20 carbon atoms.

Preferably, a polyalcohol such as glucose or a polyglycol e.g. glycerol is present in the coating to prevent the protein from becoming brittle and thus to prevent cracking or breaking of the film.

The present invention also provides a method of preparing an edible moisture barrier coating which comprises homogenising a mixture comprising from 70 to 95% of an aqueous solution of a protein isolate capable of forming a film and 30 to 5% of a mixture of a saturated lipid and emulsifier containing an amount of emulsifier from 5 to 30% based on the weight of the lipid, the lipid having a melting point higher than 30°C and the emulsifier containing one or more diacetyl tartaric acid esters of monoglycerides.

The homogenisation may be of the "high shear" type in which the temperature is conveniently from 30° to 50°C and the duration of the homogenisation may be from 1 minute to 30 minutes. The homogenisation can also be achieved by passing a well-stirred mixture of the ingredients through a homogeniser with the normal setting for the homogenisation of milk (two stage - 1st stage 2500 psi, 2nd stage 500 psi) where the temperature is held so that the oil will not solidify before homogenisation is complete.

The present invention also provides a process for coating a food substrate to be formed into a heterogeneous product with a food component of higher water activity which comprises applying a solution of the above described edible moisture barrier coating onto the food substrate in an amount effective to retard moisture migrating from the food component with the higher water activity into the food substrate when formed into the heterogeneous food product.
The amount of coating on the food substrate is usually within the range of from 2% to 15% and preferably from

5% to 12% by weight based on the weight of the food substrate on a dry weight basis.

The coating may be applied onto the food component by various conventional techniques apparent to those skilled in the art e.g. brushing, dipping or spraying. The coating may be applied, if desired, by heat-set or cold-set methods.

In a heat-set method, the coating may be applied at a temperature from, for instance, 30° to 50°C and preferably from 35° to 45°C conveniently in a fluid bed. The duration of the application may conveniently be from 20 to 60 minutes.

In a cold-set method, the coating may be applied at a temperature from 0°C to 10°C, preferably from 4°C to 8°C conveniently in a pan. The duration of coating may conveniently be from 20 to 60 minutes. After coating, the coated food component may be placed in a freezer at a temperature less than -35°C for final setting of the coating.

The coating of this invention may be applied to a variety of substrates e.g. cake, chocolate, almonds, pizza, pasta or vegetables.

The present invention further provides a method for preparing a heterogeneous food product containing components of different water activities which comprises applying a solution of the above described edible moisture barrier coating onto the food component with the lower water activity and then forming the two food components into the heterogeneous food product wherein the amount of coating is effective to retard moisture migration from the food component with the higher water activity into the coated food component.

The heterogeneous food product may be formed, for example, by incorporating one component into the other or by coating one component onto the other component.

The coating of this invention may be used in frozen and refrigerated foods such as pizzas, French bread pizza, frozen desserts and ice cream.

The following Examples further illustrate the present invention. Parts and percentages are given by weight.

Example 1

The following ingredients were homogenised at 40°C for 5 minutes to give an edible coating:

9 parts of a 30% solution of whey protein isolate sold under the Trade-mark BI-PRO

0.8 parts of a saturated C_{12}-C_{18} fat sold under the Trade Name Durkee Satina 72 (a hard fat)

0.1 part of acetylated monoglyceride sold under the Trade-mark Grinsted Cetodan 50

0.1 part of a mixture of diacetyltartaric acid esters of monoglycerides together with mono- and diglycerides derived from saturated fat feed stocks sold under the Trade-mark Grinsted Emulsifier 901.

The product obtained was an emulsion with an average particle size of 10 microns.

Example 2

A coating emulsion was prepared by homogenising the following ingredients at 40°C for 10 minutes.

837.6 parts of a 10% solution of whey protein isolate sold under the Trade-mark BI-PRO,

109.62 parts Satina 72

28.93 parts Cetodan 50
13.70 parts Grinsted Emulsifier 901
10.00 parts Glycerol

1'600 parts of chopped almonds were place in a fluidised bed at 40°C and the above coating emulsion was sprayed on at an atomising air pressure of 12 psi with a pump over a period of 40 minutes after which time the amount of coating on the almonds was 7.5% by weight on a dry weight basis.

Almonds coated by this technique were mixed into ice cream and the coated almonds retained their texture for 6 weeks.

As a comparison, a control ice cream containing uncoated almonds was also prepared and the control almonds became soft within one week.

Example 3

4'000 parts of chopped almonds were sprayed in a coating pan at 6°C with the coating emulsion of Example 2 at an atomising air pressure of 30 psi over a period of 30 minutes after which time the amount of coating on the almonds was 9% by weight on a dry weight basis. After coating, the almonds were placed in a -40°C freezer for final setting of the coating.

CLAIMS:

1. An edible moisture barrier coating comprising from 70 to 95% of an aqueous solution of a protein isolate capable of forming a film and 30 to 5% of a mixture of a saturated lipid and emulsifier containing an amount of emulsifier from 5 to 30% based on the weight of the lipid, the lipid having a melting point higher than 30°C and the emulsifier containing one or more diacetyl tartaric acid esters of monoglycerides.

2. An edible moisture barrier coating according to claim 1, wherein the protein isolate is whey protein, caseinate, egg albumin or milk protein.

3. An edible moisture barrier coating according to claim 1 or 2, wherein the aqueous solution of the protein isolate has a concentration of from 1 to 50%.

4. An edible moisture barrier coating according to claim 1 or 2, wherein the aqueous solution of the protein isolate has a concentration of from 4 to 80%.

5. An edible moisture barrier coating according to any one of claims 1 to 4, wherein the saturated lipid contains fatty acid chains having from 10 to 20 carbon atoms.

6. An edible moisture barrier coating according to claim 5, wherein the saturated lipid contains fatty acid chains of 12 carbon atoms.

7. An edible moisture barrier coating according to any one of claims 1 to 4, wherein not more than 20% by weight of the lipids contain fatty acid chains having from 16 to 18 carbon atoms.

8. An edible moisture barrier coating according to claim 7, wherein not more than 15% by weight of the

lipids contain fatty acid chains having from 16 to 18 carbon atoms.

9. An edible moisture barrier coating according to any one of claims 1 to 8, wherein the emulsifier also contains an acetylated monoglyceride, one or more mono- or diglycerides or a mixture thereof.

10. An edible moisture barrier coating according to claim 9, wherein the mono- and diglycerides of the emulsifier are derived from saturated fat feed stocks.

11. An edible moisture barrier coating according to claim 10, wherein the saturated fat feed stocks contain fatty acid chains having from 12 to 20 carbon atoms.

12. An edible moisture barrier coating according to any one of claims 1 to 11, further comprising a polyalcohol.

13. An edible moisture barrier coating according to any one of claims 1 to 12, having an average emulsion particle size of from 5 to 30 microns.

14. An edible moisture barrier coating according to claim 13, wherein the average emulsion particle size is from 10 to 20 microns.

15. An edible moisture barrier coating according to claim 13, wherein the average emulsion particle size is from 7 to 15 microns.

16. A process of preparing an edible moisture barrier coating which comprises homogenising a mixture claimed in any one of claims 1 to 15.

17. A process for coating a food substrate to be formed into a heterogeneous product with a food component of higher water activity which comprises applying a

solution of the edible moisture barrier coating claimed in any one of claims 1 to 15 onto the food substrate in an amount effective to retard moisture migrating from the food component with the higher water activity into the food substrate when formed into the heterogeneous food product.

18. A process according to claim 17, wherein the amount of coating on the food substrate is from 2% to 15% by weight based on the weight of the food substrate on a dry weight basis.

19. A process according to claim 18, wherein the amount of coating on the food substrate is from 5% to 12% by weight based on the weight of the food substrate on a dry weight basis.

20. A process according to claim 17, 18 or 19, wherein the coating is applied by a heat-set or a cold-set method.

21. A method for preparing a heterogeneous food product containing components of different water activities which comprises applying a solution of the edible moisture barrier coating claimed in any one of claims 1 to 15 onto the food component with the lower water activity and then forming the two food components into the heterogeneous food product wherein the amount of coating is effective to retard moisture migration from the food component with the higher water activity into the coated food component.

22. A coated food substrate whenever prepared by a process according to any one of claims 17 to 20.

23. A heterogeneous food product whenever prepared by the method of claim 21.