

conventional technique, for example, there is an adhesive for foods obtained by blending syrup, a thickener, water and pulverized sugar (Patent Literature 1). However, for the adhesive composition, a sufficient adhesiveness is demanded. In addition, the adhesive composition itself
5 needs not to influence the mouthfeel or flavor of foods. More appropriate adhesive compositions have been demanded.

Furthermore, in the fields of foods, feeds, pharmaceuticals, cosmetics, and the like, the covering of a raw material powder with a coating is widely practiced to prevent the deterioration or moisture absorption of the powder
10 without the adhesion of the powder to the outside air or water, and impart the flowability, sustained releasability, masking, elution prevention, acid resistance, and so forth. In a conventional technique, for example, a coating containing triacylglycerol having a fatty acid with a carbon chain length of 8 to 12, and calcium stearate is known (Patent Literature 2). Herein, calcium
15 stearate is a coating widely used, and has been approved as a food additive without limitations on the use thereof under the current restrictions. However, it is unclear whether calcium stearate can be used without limitations in the future. Thus, appropriate coatings have been demanded instead of calcium stearate.

Citation List

Patent Literatures

[0003]

Patent Literature 1: Japanese Patent Application Publication No. Hei
25 1-101849

Patent Literature 2: Japanese Patent Application Publication No.
2013-184888

Summary

30 [0003a] In one aspect of the present disclosure, there is provided a powdered

fat and/or oil-containing adhesive composition comprising a fat and/or oil ingredient comprising at least one type of a XXX triglyceride having fatty acid residues X, each with x carbon atoms, at positions 1 to 3 of glycerin, wherein

x number of carbon atoms is an integer selected from 10 to 22,
the fat and/or oil ingredient comprises a β -form fat and/or oil,
particles of the powdered fat and/or oil-containing adhesive composition have a plate-like shape, and

the powdered fat and/or oil-containing adhesive composition has a loose bulk density of 0.05 to 0.6 g/cm³.

[0003b] In another aspect of the present disclosure, there is provided an adhesive comprising the powdered fat and/or oil-containing adhesive composition disclosed herein.

[0003c] In a further aspect of the present disclosure, there is provided a coating comprising the powdered fat and/or oil-containing adhesive composition disclosed herein.

[0003d] In another aspect of the present disclosure, there is provided a method for producing a powdered fat and/or oil-containing adhesive composition comprising a fat and/or oil ingredient comprising at least one type of a XXX triglyceride having fatty acid residues X, each with x carbon atoms, at positions 1 to 3 of glycerin, wherein

x number of carbon atoms is an integer selected from 10 to 22,
at least a portion of the fat and/or oil ingredient is a β -form fat and/or

oil,
particles of the powdered fat and/or oil-containing adhesive composition have a plate-like shape,

the powdered fat and/or oil-containing adhesive composition has a loose bulk density of 0.05 to 0.6 g/cm³, and

the method comprises the following steps of:

(a) preparing a fat and/or oil composition raw material containing a XXX triglyceride; and

5 (d) cooling and solidifying the fat and/or oil composition raw material to obtain a powdered fat and/or oil-containing adhesive composition comprising a β -form fat and/or oil whose particles have a plate-like shape.

[0003e] In a further aspect of the present disclosure, there is provided a food, a feed, a pharmaceutical, or a cosmetic comprising the powdered fat and/or
10 oil-containing adhesive composition disclosed herein.

[0003f] In another aspect of the present disclosure, there is provided a food, a feed, a pharmaceutical, or a cosmetic comprising the adhesive disclosed herein, or the coating disclosed herein.

[0003g] In another aspect of the present disclosure, there is provided a
15 method for producing a food containing a powdered fat and/or oil-containing adhesive composition comprising a fat and/or oil ingredient comprising at least one type of a XXX triglyceride having fatty acid residues X, each with x carbon atoms, at positions 1 to 3 of glycerin, wherein

x number of carbon atoms is an integer selected from 10 to 22,

20 at least a portion of the fat and/or oil ingredient is a β -form fat and/or oil,

particles of the powdered fat and/or oil-containing adhesive composition have a plate-like shape,

the powdered fat and/or oil-containing adhesive composition has a
25 loose bulk density of 0.05 to 0.6 g/cm³, and

the method comprises the following steps of:

(a) preparing a fat and/or oil composition raw material containing a XXX triglyceride;

(d) cooling and solidifying the fat and/or oil composition raw material in a molten state to obtain a powdered fat and/or oil-containing adhesive composition comprising a β -form fat and/or oil whose particles have a plate-like shape; and

(f) adding the obtained powdered fat and/or oil-containing adhesive composition to a food raw material to obtain a food containing the powdered fat and/or oil-containing adhesive composition.

diffraction measurement of the powdered fat and/or oil-containing adhesive composition is 0.2 or more.

[7] The powdered fat and/or oil-containing adhesive composition according to any one of [1] to [6], wherein the powdered fat and/or oil-containing adhesive composition has a thickness of 4 μm or less.

[8] An adhesive comprising the powdered fat and/or oil-containing adhesive composition according to any one of [1] to [7].

[9] A coating comprising the powdered fat and/or oil-containing adhesive composition according to any one of [1] to [7].

[10] The coating according to [9], wherein an average particle diameter of particles of the powdered fat and/or oil-containing adhesive composition determined by laser diffraction/scattering methods is 20 μm or less.

[11] A method for producing a powdered fat and/or oil-containing adhesive composition comprising a fat and/or oil ingredient comprising at least one type of a XXX triglyceride having fatty acid residues X, each with x carbon atoms, at positions 1 to 3 of glycerin, wherein

x number of carbon atoms is an integer selected from 10 to 22,

at least a portion of the fat and/or oil ingredient is a β -form fat and/or oil,

particles of the powdered fat and/or oil-containing adhesive composition have a plate-like shape,

the powdered fat and/or oil-containing adhesive composition has a loose bulk density of 0.05 to 0.6 g/cm^3 , and

the method comprises the following steps of:

(a) preparing a fat and/or oil composition raw material containing a XXX triglyceride; and

(d) cooling and solidifying the fat and/or oil composition raw material to obtain a powdered fat and/or oil-containing adhesive composition comprising a β -form fat and/or oil whose particles have a plate-like shape.

[12] The method according to [11], comprising, as step (b), a step of heating

adhesive composition containing a β -form fat and/or oil whose particles have a plate-like shape.

Further, the present invention makes it possible to provide an adhesive composition containing a β -form fat and/or oil containing at least one type of a XXX triglyceride having fatty acid residues X, each with x carbon atoms, at positions 1 to 3 of glycerin, the adhesive composition containing the β -form fat and/or oil characterized in that x number of carbon atoms is an integer selected from 10 to 22, and particles of the β -form fat and/or oil have a plate-like shape and have a diffraction peak at 4.5 to 4.7 Å in an X-ray diffraction measurement.

In addition, the present invention makes it possible to provide an adhesive composition and an adhesive having a sufficient adhesiveness and a coating having a sufficient covering performance.

Brief Description of Drawings

[0008]

[Fig. 1] Fig. 1 is micrographs in which 1% by mass of (a) a powdered fat and/or oil-containing composition of Example 1 of the present invention and 1% by mass of (b) calcium stearate of Comparative Example 2 adhere to surfaces of glass beads.

[Fig. 2] Fig. 2 is a photograph of an appearance of a powdered fat and/or oil-containing adhesive composition A (β -form fat and/or oil) of Production Example 7 of the present invention.

[Fig. 3] Fig. 3 is a photograph of an appearance of the powdered fat and/or oil-containing adhesive composition A (β -form fat and/or oil) of Production Example 7 of the present invention.

[Fig. 4] Fig. 4 is a photograph of an appearance of a fat and/or oil composition (α -form fat and/or oil) of Comparative Production Example 3 of the present invention.

[Fig. 5] Fig. 5 is a micrograph of the powdered fat and/or oil-containing adhesive composition

A (β -form fat and/or oil) of Production Example 7 of the present invention.

[Fig. 6] Fig. 6 is a micrograph of the fat and/or oil composition (α -form fat and/or oil) of Comparative Production Example 3 of the present invention.

[Fig. 7] Fig. 7 is an X-ray diffractogram of the powdered fat and/or
5 oil-containing adhesive composition A (β -form fat and/or oil) of Production Example 7 of the present invention.

[Fig. 8] Fig. 8 is an X-ray diffractogram of the fat and/or oil composition (α -form fat and/or oil) of Comparative Production Example 3 of the present invention.

10 [Fig. 9] Fig. 9 is a micrograph of the powdered fat and/or oil-containing adhesive composition A (β -form fat and/or oil) before pulverization of Example 7 of the present invention.

[Fig. 10] Fig. 10 is a micrograph of the powdered fat and/or oil-containing adhesive composition A (β -form fat and/or oil) of Example 7 of the present
15 invention.

[Fig. 11] Fig. 11 is a micrograph of a pulverized fat and/or oil (α -form fat and/or oil) of Comparative Example 1 of the present invention.

[Fig. 12] Fig. 12 is a micrograph in which 1% by mass (outer percentage) of the powdered fat and/or oil-containing adhesive composition A (β -form fat and/or oil) of Example 7 of the present invention adheres to surfaces of glass
20 beads by adding and mixing the powdered fat and/or oil-containing adhesive composition A to the glass beads.

[Fig. 13] Fig. 13 is a micrograph in which 1% by mass (outer percentage) of the pulverized fat and/or oil (α -form fat and/or oil) of Comparative Example 1
25 of the present invention adheres to surfaces of glass beads by adding and mixing the pulverized fat and/or oil to the glass beads.

[Fig. 14] Fig. 14 is a micrograph in which 1% by mass (outer percentage) of the calcium stearate of Comparative Example 2 adheres to surfaces of glass beads by adding and mixing the calcium stearate to the glass beads.

30 [Fig. 15] Fig. 15 is a micrograph in which the powdered fat and/or

oil-containing adhesive composition A (β -form fat and/or oil) of Example 7 of the present invention adheres to surfaces of glass beads, and sites measured as thicknesses of particles are indicated by straight lines (3 sites).

[Fig. 16] Fig. 16 is a micrograph in which the pulverized fat and/or oil (α -form fat and/or oil) of Comparative Example 1 of the present invention adheres to surfaces of glass beads, and sites measured as thicknesses of particles are indicated by straight lines (3 sites).

[Fig. 17] Fig. 17 is a diagram schematically showing the micrographs of Figs. 15 and 16. In the diagram, A depicts a core substance, B depicts a coating substance, and a length of line segment ab depicts a value of a thickness of a particle made to adhere to the surface of the core substance.

Description of Embodiments

[0009]

<Powdered Fat and/or Oil-Containing Adhesive Composition>

The present invention relates to a powdered fat and/or oil-containing adhesive composition containing a fat and/or oil ingredient containing at least one type of a XXX triglyceride having fatty acid residues X, each with x carbon atoms, at positions 1 to 3 of glycerin, the powdered fat and/or oil-containing adhesive composition characterized in that x number of carbon atoms is an integer selected from 10 to 22, the fat and/or oil ingredient contains a β -form fat and/or oil, particles of the powdered fat and/or oil-containing adhesive composition have a plate-like shape, and the powdered fat and/or oil-containing adhesive composition has a loose bulk density of 0.05 to 0.6 g/cm³. Hereinafter, the powdered fat and/or oil-containing adhesive composition of the present invention will be described in detail.

[0010]

<Fat and/or Oil Ingredient>

The powdered fat and/or oil-containing adhesive composition of the

composition raw material to obtain a powdered fat and/or oil-containing adhesive composition containing a β -form fat and/or oil whose particles have a plate-like shape and having an adhesiveness. Note that the powdered fat and/or oil-containing composition can also be produced by subjecting a solid
 5 resulting after the cooling to known pulverization means such as a hammer mill or a cutter mill.

[0019]

In step (d), the fat and/or oil composition raw material in the molten state is cooled, for example, at a temperature which is lower than a melting
 10 point of the β -form fat and/or oil of the fat and/or oil ingredient incorporated in the fat and/or oil composition raw material, and which is not lower than a cooling temperature obtained from the following formula:

cooling temperature ($^{\circ}\text{C}$) = x number of carbon atoms $\times$ 6.6 - 68.

By cooling within such a temperature range, the β -form fat and/or oil can be
 15 efficiently produced, forming fine crystals, so that the powdered fat and/or oil-containing adhesive composition can be easily obtained. Note that the term "fine" refers to having primary particles (the smallest crystal) of for example 20 μm or less, preferably 15 μm or less, and more preferably 10 μm . Meanwhile, if the cooling is not performed within the temperature range, the
 20 β -form fat and/or oil is not formed, a solid having voids with a larger volume than the fat and/or oil composition raw material cannot be formed in some cases (Comparative Production Examples 1, 3). Further, in the present invention, the cooling within the temperature range forms the β -form fat and/or oil in a still state, and makes particles of the powdered fat and/or
 25 oil-containing adhesive composition have a plate-like shape. The cooling method is useful for specifying the powdered fat and/or oil-containing adhesive composition of the present invention.

[0020]

<Properties of Powdered Fat and/or Oil-Containing Adhesive Composition>

30 The powdered fat and/or oil-containing composition of the present

Next, the present invention will be described in detail based on Comparative Examples and Examples.

[Analysis Methods]

- Triglyceride Composition

5 Gas chromatography analysis conditions

DB1-ht (0.32 mm × 0.1 μm × 5 m) Agilent Technologies Inc. (123-1131)

Injected amount: 1.0 μL

Injection inlet: 370°C

Detector: 370°C

10 Split ratio: 50/1, 35.1 kPa constant pressure

Column CT: 200°C (0 min hold) to (15°C/min) to 370°C (4 min hold)

- Loose Bulk Density

The loose bulk densities (g/cm³) of powdered fat and/or oil-containing adhesive compositions obtained in Examples and so forth were determined by:
 15 letting each powdered fat and/or oil-containing adhesive composition fall approximately 2 cm above an upper opening end of a graduated cylinder with an inner diameter 15 mm × 25 mL to loosely fill the graduated cylinder; measuring a mass (g) and reading a volume (mL) thus filled; and calculating a mass (g) of the powdered fat and/or oil-containing adhesive composition per mL.

20 [0047]

- Aspect Ratio

Particles were directly observed with a scanning electron microscope S-3400N (manufactured by Hitachi High-Technologies Corporation). Using software for measuring particle size distribution through image analysis
 25 (Mac-View manufactured by Mountech Co., Ltd.), arbitrarily selected particles were measured for lengths in the major-axis and minor-axis directions, and the average of the measured particles was obtained.

- Average Particle Diameter

The average particle diameters were measured based on laser
 30 diffraction/scattering methods (ISO133201, ISO9276-1) using a particle size

distribution measuring apparatus (Microtrac MT3300ExII manufactured by Nikkiso Co., Ltd.).

- X-ray diffraction measurement

The measurement was performed using an X-ray diffraction system
 5 Ultima IV (manufactured by Rigaku Corporation), CuK α ($\lambda = 1.542 \text{ \AA}$) as the radiation source and a filter for Cu under conditions of: an output of 1.6 kW, an operation angle of 0.96 to 30.0°, and a measurement speed of 2°/minute. This measurement confirmed the existences of an α -form fat and/or oil, a β' -form fat and/or oil, and a β -form fat and/or oil in a fat and/or oil ingredient
 10 containing a XXX triglyceride. If there was a peak only near 4.6 $\text{\AA}$ and no peak near 4.1 to 4.2 $\text{\AA}$, all the fat and/or oil ingredient was determined as a β -form fat and/or oil.

Note that, from the X-ray diffraction measurement result, a peak intensity ratio = [β -form characteristic peak intensity ($2\theta = 19^\circ$ (4.6
 15 $\text{\AA}$))]/(α -form characteristic peak intensity ($2\theta = 21^\circ$ (4.2 $\text{\AA}$)) + β -form characteristic peak intensity ($2\theta = 19^\circ$ (4.6 $\text{\AA}$))) was measured as the indicator indicating the abundance of the β -form fat and/or oil.

- Crystal (Micrograph)

Images of crystals of the obtained powdered fat and/or oil-containing
 20 adhesive compositions were captured using a 3D real surface view microscope VE-8800 (manufactured by Keyence Corporation). The obtained micrographs are shown in Fig. 4 (Example 7) and Fig. 5 (Comparative Example 3).

[0048]

25 <Preparation of Compositions of Examples and Comparative Examples>

(1) Powdered Fat and/or Oil-Containing Adhesive Composition A Used in Examples 1 to 9

First, 25 g of a triglyceride having stearic acid residues (each having 18 carbon atoms) at positions 1 to 3 (XXX type: 79.1% by mass, highly
 30 hydrogenated rapeseed oil, manufactured by Yokozeki Oil & Fat Industries

4: relative to 100% by mass of the entire powder, 10 to 30% by mass was solidified.

3: relative to 100% by mass of the entire powder, 30 to 60% by mass was solidified.

5 2: relative to 100% by mass of the entire powder, 60 to 90% by mass was solidified.

1: mostly solidified.

[0061]

[Table 6]

Table 6	Example 10	Comparative Example 3	Reference Example 1
After 1 day	5	2	1
After 4 days	4	2	1
After 7 days	4	1	1

10

[0062]

As apparent from the result of Table 6, it was found out that the powder produced by using the powdered fat and/or oil-containing adhesive composition A of the present invention suppressed the moisture absorption and prevented the caking in comparison with the powder produced by using the normal hydrogenated palm oil powder, like the result in Table 5. To put it differently, the storage test also verified that the powdered fat and/or oil-containing adhesive composition A of the present invention acts as a coating and has excellent functions of preventing moisture absorption and caking.

20

[0063]

Hereinafter, Production Examples of the powdered fat and/or oil-containing adhesive composition of the present invention will be further shown. The compositions in a powder form obtained by these Production Examples also produce an excellent adhesiveness and coating properties, as in Examples described above.

25

[0086]

<Caking Prevention Test of Caster Sugar>

To 19.4 g of caster sugar (distributed by Seiyu GK), 0.6 g (inner percentage of 3% by mass) of the powdered fat and/or oil-containing adhesive composition A of Examples 1, 2, 6, and 7 was added. After well mixing in a beaker for 3 minutes, 10 g of the obtained mixture was put in a petri dish and stored without a lid at a temperature of 20°C for 72 hours in an atmosphere of 70% humidity. The powder in the petri dish thus stored was placed in a 10-mesh screen and shake-sifted for 10 seconds in a screen shaker (manufactured by AS ONE Corporation). The caking percentage of the caster sugar was calculated according to the equation given below. The result is shown in Table 8.

Caking percentage (% by mass) of caster sugar = the mass of the powder remaining on the screen/the mass of the sifted powder $\times$ 100

For comparison, 10 g each of a powder consisting of caster sugar and a powder obtained by adding 0.6 g (inner percentage of 3% by mass) of the pulverized fat and/or oil of Comparative Example 1 or calcium stearate (manufactured by Merck KGaA, Parteck LUB CST (loose bulk density: 0.13 g/cm³, aspect ratio of 1.4, average particle diameter of 6.5 μ m)) to 19.4 g of caster sugar were stored in the same way as above, and the caking percentage of the caster sugar was calculated. The result is shown in Table 8.

[0087]

powder remaining on the screen/the mass of the sifted powder $\times 100$

For comparison, the caking percentage of common salt was calculated in the same way as above as to a powder consisting of common salt and pulverized fat and/or oil of Comparative Example 1. The result is shown in Table 9.

5 [0090]
[Table 9]

Table 9 Caking Prevention Test Result of Common Salt			
	Test 8	Test 9	Test 10
Additive	None	Powdered fat and/or oil-containing adhesive composition A of Example 7	Pulverized fat and/or oil of Comparative Example 1
Caking percentage	99.4	57.2	99.8

[0091]

10 From the result in Table 9, it was found that the caking of common salt can be prevented by adding the powdered fat and/or oil-containing composition of the present invention to the common salt, as compared with the case of adding the pulverized fat and/or oil of Comparative Example 1.

[0092]

<Coating Percentage Analysis Test Using Glass Beads (Core Substance Model)>

15 Each of evaluation samples of the powdered fat and/or oil-containing adhesive compositions A of Examples 1, 2, 6, and 7, the pulverized fat and/or oil of Comparative Example 1, and calcium stearate (manufactured by Merck KGaA, Parateck LUB CST (loose bulk density: 0.13 g/cm³, aspect ratio of 1.4, average particle diameter of 6.5 μ m)) was evaluated for the coating percentage
20 on surfaces of glass beads (BZ-01, average particle diameter of 105 μ m, AS ONE Corporation) when the evaluation sample was mixed with

of 1.1 or more.

[Claim 6]

The powdered fat and/or oil-containing adhesive composition according to any one of claims 1 to 5, wherein a peak intensity ratio (a peak intensity at 4.6 Å/(the peak intensity at 4.6 Å + a peak intensity at 4.2 Å)) in an X-ray diffraction measurement of the powdered fat and/or oil-containing adhesive composition is 0.2 or more.

[Claim 7]

The powdered fat and/or oil-containing adhesive composition according to any one of claims 1 to 6, wherein the powdered fat and/or oil-containing adhesive composition has a thickness of 4 μm or less.

[Claim 8]

An adhesive comprising the powdered fat and/or oil-containing adhesive composition according to any one of claims 1 to 7.

[Claim 9]

A coating comprising the powdered fat and/or oil-containing adhesive composition according to any one of claims 1 to 7.

[Claim 10]

The coating according to claim 9, wherein an average particle diameter of particles of the powdered fat and/or oil-containing adhesive composition determined by laser diffraction/scattering methods is 20 μm or less.

[Claim 11]

A method for producing a powdered fat and/or oil-containing adhesive composition comprising a fat and/or oil ingredient comprising at least one type of a XXX triglyceride having fatty acid residues X, each with x carbon atoms, at positions 1 to 3 of glycerin, wherein

x number of carbon atoms is an integer selected from 10 to 22,

at least a portion of the fat and/or oil ingredient is a β-form fat and/or oil, particles of the powdered fat and/or oil-containing adhesive