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(54) **PACKAGING BODY AND PRODUCTION METHOD THEREFOR**

- (57) A packaging body provided with an inner bag having air permeability, an outer bag covering the inner bag, and contents accommodated in the inner bag, wherein the outer bag has a water vapor transmission
- rate of 1 g/(m²·day) or less, an oxygen transmission rate of 1 cc/(m²·day·atom) or less, and a visible light transmission rate of 50% or more; and the contents are carbon black having a bulk density of 0.3 g/cm³ or less.

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Description

TECHNICAL FIELD

[0001] The present invention relates to a packaging body and a production method therefor.

BACKGROUND

[0002] In recent years, carbon black has been used for various applications, and carbon black having various types of physical properties in accordance with the application have been studied. For example, Patent Document 1 discloses a carbon black that is suitable for use as a catalyst support for fuel cells.

CITATION LIST

PATENT LITERATURE

[0003] Patent Document 1: JP 2017-206568 A

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] There are cases in which carbon black is provided as a powder with a low bulk density, and a method for easily packaging such a powder while maintaining the low bulk density is sought. Additionally, carbon black with a low bulk density easily absorbs moisture from the atmosphere and is therefore difficult to maintain with a low water content. Additionally, with carbon black, it is difficult to discern the differences between individual products from their appearance. Therefore, the packaging body preferably has product information that is printed and that is easy to discern.

[0005] One objective of the present invention is to provide a packaging body having carbon black with a low bulk density as the contents thereof, which can store the carbon black while maintaining a low water content, on which product information can be easily printed, and from which the printing can be easily discerned. Additionally, one objective of the present invention is to provide a production method for a packaging body that can easily produce the above-mentioned packaging body.

SOLUTION TO PROBLEM

[0006] The present invention, for example, relates to [1]-[11] below.

[1] A packaging body comprising an inner bag having air permeability, an outer bag covering the inner bag, and contents accommodated in the inner bag, wherein:

the outer bag has a water vapor transmission rate of $1 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, an oxygen transmission rate of $1 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, and a visible light transmission rate of 50% or more; and

the contents are carbon black having a bulk density of $0.3 \text{ g}/\text{cm}^3$ or less.

[2] The packaging body according to [1], wherein the inner bag has an air permeability of $1 \text{ } \mu\text{m}/(\text{Pa} \cdot \text{s})$ or more.

[3] The packaging body according to [1] or [2], wherein a BET specific surface area of the carbon black is $100 \text{ m}^2/\text{g}$ or more.

[4] The packaging body according to any one of [1]-[3], wherein the outer bag includes a resin layer having a vapor deposition film of an inorganic oxide formed on at least one surface thereof.

[5] The packaging body according to any one of [1]-[4], wherein the outer bag includes a first resin layer having a vapor deposition film of an inorganic oxide formed on at least one surface thereof, and a second resin layer containing a polyethylene-based resin.

[6] The packaging body according to any one of [1]-[5], wherein a coefficient of static friction between outer surfaces of

the outer bag is 0.2 or more and 1 or less.

[7] The packaging body according to any one of [1]-[6], wherein a water content of the carbon black is 1 mass% or less.

[8] The packaging body according to any one of [1]-[7], wherein the inner bag is made of kraft paper.

[9] The packaging body according to any one of [1]-[8], wherein the inner bag comprises an opening for blowing air.

[10] A production method for a packaging body including:

an accommodation step of air-blowing contents into an inner bag having air permeability and accommodating the contents in the inner bag;

a covering step of covering, with an outer bag, the inner bag accommodating the contents; and

a deaeration step of deaerating an inside of the outer bag;

wherein

the outer bag has a water vapor transmission rate of 1 g/(m²·day) or less, an oxygen transmission rate of 1 cc/(m²·day·atom) or less, and a visible light transmission rate of 50% or more; and

the contents are carbon black having a bulk density of 0.3 g/cm³ or less.

[11] The production method according to [10], wherein the deaeration is deaeration by depressurization to -20 kPa or less.

EFFECTS OF INVENTION

[0007] According to the present invention, a packaging body having carbon black with a low bulk density as the contents thereof, which can store the carbon black while maintaining a low water content, on which product information can be easily printed, and from which the printing can be easily discerned is provided. Additionally, according to the present invention, a production method for a packaging body that can easily produce the above-mentioned packaging body is provided.

DESCRIPTION OF EMBODIMENTS

[0008] Hereinafter, preferred embodiments of the present invention will be explained in detail.

[0009] The packaging body of the present embodiment is provided with an inner bag having air permeability, an outer bag covering the inner bag, and contents accommodated in the inner bag. In the present embodiment, the outer bag has a water vapor transmission rate of 1 g/(m²·day) or less, an oxygen transmission rate of 1 cc/(m²·day·atom) or less, and a visible light transmission rate of 50% or more. Additionally, in the present embodiment, the contents are carbon black having a bulk density of 0.3 g/cm³ or less.

[0010] In the packaging body of the present embodiment, the inner bag has air permeability. Therefore, the contents can be accommodated in the inner bag by being air-blown. With supply methods using auger screws, etc., carbon black with a low bulk density tends to scatter and is therefore difficult to handle, requiring time to fill an inner bag. Meanwhile, by means of air-blowing, carbon black with a low bulk density can easily be made to fill an inner bag in a short time. For this reason, the packaging body in the present embodiment has the advantage of being easy to produce while having carbon black with a low bulk density as the contents thereof.

[0011] Additionally, in the packaging body of the present embodiment, the water vapor transmission rate and the oxygen transmission rate of the outer bag are extremely low. Therefore, even if the inner bag has air permeability, the outer bag can block infiltration by moisture and oxygen, and the water content of the carbon black constituting the contents can be kept low.

[0012] Furthermore, in the packaging body of the present embodiment, the visible light transmission rate of the outer bag is high. Therefore, product information, etc. printed on the inner bag can be easily seen and discerned without removing the inner bag from the outer bag. Additionally, since damage, etc. to the inner bag can be easily seen, unintended scattering, etc. of the contents can be avoided when opening the outer bag, and the packaging body is exceptionally easy to handle.

(Contents)

[0013] In the packaging body of the present embodiment, the contents are carbon black having a low bulk density.

[0014] The bulk density of the carbon black is 0.3 g/cm³ or less, and may be 0.25 g/cm³ or less, 0.2 g/cm³ or less, or 0.15 g/cm³ or less. Additionally, the bulk density of the carbon black may be, for example, 0.01 g/cm³ or more, 0.03 g/cm³ or more, 0.05 g/cm³ or more, or 0.07 g/cm³ or more. That is, the bulk density of the carbon black may be, for example, 0.01 g/cm³ or more and 0.3 g/cm³ or less, 0.01 g/cm³ or more and 0.25 g/cm³ or less, 0.01 g/cm³ or more and 0.2 g/cm³ or less, 0.01 g/cm³ or more and 0.15 g/cm³ or less, 0.03 g/cm³ or more and 0.3 g/cm³ or less, 0.03 g/cm³ or more and 0.25 g/cm³ or less, 0.03 g/cm³ or more and 0.2 g/cm³ or less, 0.03 g/cm³ or more and 0.15 g/cm³ or less, 0.05 g/cm³ or more and 0.3 g/cm³ or less, 0.05 g/cm³ or more and 0.25 g/cm³ or less, 0.05 g/cm³ or more and 0.2 g/cm³ or less, 0.05 g/cm³ or more and 0.15 g/cm³ or less, 0.07 g/cm³ or more and 0.3 g/cm³ or less, 0.07 g/cm³ or more and 0.25 g/cm³ or less, 0.07 g/cm³ or more and 0.2 g/cm³ or less, or 0.07 g/cm³ or more and 0.15 g/cm³ or less.

[0015] In the present description, the bulk density of the carbon black refers to the value measured in accordance with JIS K 5101-12-2.

[0016] The BET specific surface area of the carbon black may be, for example, 100 m²/g or more, 150 m²/g or more, 200 m²/g or more, or 250 m²/g or more. Carbon black having a large BET specific surface area tends to have high moisture absorption properties and can thus more prominently achieve the effects due to the packaging body of the present embodiment. Additionally, the BET specific surface area of the carbon black may be, for example, 900 m²/g or less, 700 m²/g or less, or 500 m²/g or less. That is, the BET specific surface area of the carbon black may be, for example, 100 m²/g or more and 900 m²/g or less, 100 m²/g or more and 700 m²/g or less, 100 m²/g or more and 500 m²/g or less, 150 m²/g or more and 900 m²/g or less, 150 m²/g or more and 700 m²/g or less, 150 m²/g or more and 500 m²/g or less, 200 m²/g or more and 900 m²/g or less, 200 m²/g or more and 700 m²/g or less, 200 m²/g or more and 500 m²/g or less, 250 m²/g or more and 900 m²/g or less, 250 m²/g or more and 700 m²/g or less, or 250 m²/g or more and 500 m²/g or less.

[0017] In the present description, the BET specific surface area of the carbon black refers to the value measured in accordance with "Method A: Flow Method (Thermal Conductivity Measurement Method)" in JIS K 6217-2:2017.

[0018] In the packaging body of the present embodiment, the water content of the carbon black may be, for example, 1% by mass or less, 0.5% by mass or less, 0.3% by mass or less, or 0.1% by mass or less. In the packaging body of the present embodiment, such low water contents can be easily maintained. The lower limit of the water content of the carbon black is not particularly limited, and may be, for example, 0% by mass.

[0019] In the present description, the water content of the carbon black refers to the value measured in accordance with JIS K 1469:2003.

[0020] The type of carbon black is not particularly limited, and may be, for example, acetylene black, furnace black, thermal black, etc. Among the above, acetylene black can easily be provided with a low bulk density and tends to have the problem mentioned above, and is therefore particularly suited to application of the packaging body of the present embodiment.

(Inner bag)

[0021] The inner bag has air permeability. For this reason, carbon black with a low bulk density can be easily accommodated in the inner bag by being air-blown.

[0022] The air permeability of the inner bag may be, for example, 1 μm/(Pa·s) or more, 2 μm/(Pa·s) or more, or 3 μm/(Pa·s) or more. The upper limit of the air permeability of the inner bag is not particularly limited. The air permeability of the inner bag may be, for example, 6 μm/(Pa·s) or less, 5 μm/(Pa·s) or less, or 4 μm/(Pa·s) or less. That is, the air permeability of the inner bag may be, for example, 1 μm/(Pa·s) or more and 6 μm/(Pa·s) or less, 1 μm/(Pa·s) or more and 5 μm/(Pa·s) or less, 1 μm/(Pa·s) or more and 4 μm/(Pa·s) or less, 2 μm/(Pa·s) or more and 6 μm/(Pa·s) or less, 2 μm/(Pa·s) or more and 5 μm/(Pa·s) or less, 2 μm/(Pa·s) or more and 4 μm/(Pa·s) or less, 3 μm/(Pa·s) or more and 6 μm/(Pa·s) or less, 3 μm/(Pa·s) or more and 5 μm/(Pa·s) or less, or 3 μm/(Pa·s) or more and 4 μm/(Pa·s) or less.

[0023] In the present description, the air permeability of the inner bag refers to the value measured in accordance with JIS P 8117:2009.

[0024] The material constituting the inner bag is not particularly limited and may be, for example, paper (for example, kraft paper), a woven fabric, a nonwoven fabric, etc. The inner bag is preferably made of kraft paper from the aspect of obtaining both sufficient air permeability and strength.

[0025] The capacity of the inner bag is not particularly limited and may be, for example, 0.001 m³ or more, 0.005 m³ or more, or 0.01 m³ or more. Additionally, the capacity of the inner bag may be, for example, 1 m³ or less, or 0.1 m³ or less. That is, the capacity of the inner bag may be, for example, 0.001 m³ or more and 1 m³ or less, 0.001 m³ or more and 0.1 m³ or less, 0.005 m³ or more and 1 m³ or less, 0.005 m³ or more and 0.1 m³ or less, 0.01 m³ or more and 1 m³ or less, or 0.01 m³ or more and 0.1 m³ or less.

[0026] The inner bag may be provided with an opening for blowing air. The size of the opening may be changed, as

appropriate, in accordance with the size, etc. of a supply port of an air-blowing apparatus.

(Outer bag)

[0027] The outer bag covers the inner bag and has the function of obstructing the supply of outside air to the inner bag and to the contents, thereby preventing water absorption (moisture absorption) by the contents.

[0028] The water vapor transmission rate of the outer bag is $1 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, and may be $0.8 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.6 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, or $0.4 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less. The lower limit of the water vapor transmission rate of the outer bag is not particularly limited. The water vapor transmission rate of the outer bag may be, for example, $0.001 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more, $0.005 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more, or $0.01 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more. That is, the water vapor transmission rate of the outer bag may be, for example, $0.001 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $1 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.001 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $0.8 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.001 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $0.6 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.001 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $0.4 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.005 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $1 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.005 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $0.8 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.005 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $0.6 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.005 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $0.4 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.01 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $1 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.01 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $0.8 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, $0.01 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $0.6 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less, or $0.01 \text{ g}/(\text{m}^2 \cdot \text{day})$ or more and $0.4 \text{ g}/(\text{m}^2 \cdot \text{day})$ or less.

[0029] In the present description, the water vapor transmission rate of the outer bag refers to the value measured in accordance with condition B (temperature $40 \pm 0.5 \text{ }^\circ\text{C}$, relative humidity $90 \pm 2\%$) in JIS Z 0208:1976.

[0030] The oxygen transmission rate of the outer bag is $1 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, and may be $0.8 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.6 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, or $0.4 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less. The lower limit of the oxygen transmission rate of the outer bag is not particularly limited. The oxygen transmission rate of the outer bag may be, for example, $0.001 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more, $0.005 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more, or $0.01 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more. That is, the oxygen transmission rate of the outer bag may be, for example, $0.001 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $1 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.001 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $0.8 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.001 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $0.6 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.001 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $0.4 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.005 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $1 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.005 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $0.8 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.005 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $0.6 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.005 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $0.4 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.01 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $1 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.01 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $0.8 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, $0.01 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $0.6 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less, or $0.01 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or more and $0.4 \text{ cc}/(\text{m}^2 \cdot \text{day} \cdot \text{atom})$ or less.

[0031] In the present description, the oxygen transmission rate of the outer bag refers to the value measured in accordance with JIS K 7126-2:2006.

[0032] The visible light transmission rate of the outer bag is 50% or more, and may be 60% or more, 70% or more, 80% or more, or 85% or more. The upper limit of the visible light transmission rate of the outer bag is not particularly limited. The visible light transmission rate of the outer bag may be 100% or less, and may be 99% or less, 97% or less, or 95% or less. That is, the visible light transmission rate of the outer bag may be, for example, 50% or more and 100% or less, 50% or more and 99% or less, 50% or more and 97% or less, 50% or more and 95% or less, 60% or more and 100% or less, 60% or more and 99% or less, 60% or more and 97% or less, 60% or more and 95% or less, 70% or more and 100% or less, 70% or more and 99% or less, 70% or more and 97% or less, 70% or more and 95% or less, 80% or more and 100% or less, 80% or more and 99% or less, 80% or more and 97% or less, 80% or more and 95% or less, 85% or more and 100% or less, 85% or more and 99% or less, 85% or more and 97% or less, or 85% or more and 95% or less.

[0033] In the present description, the visible light transmission rate of the outer bag refers to the value measured in accordance with JIS K 7375-2:2008.

[0034] The outer bag may have a first resin layer having a vapor deposition film of an inorganic oxide formed on at least one surface thereof. According to such a first resin layer, the water vapor transmission rate, the oxygen transmission rate, and the visible light transmission rate mentioned above can be easily realized.

[0035] The resin material (first resin material) constituting the first resin layer may be, for example, a polyester-based resin (for example, polyethylene terephthalate), a polyamide-based resin, a polyolefin-based resin, etc., and is preferably a polyester-based resin (for example, polyethylene terephthalate).

[0036] The inorganic oxide constituting the vapor deposition film may be, for example, alumina, silica, etc.

[0037] Although the thickness of the first resin layer is not particularly limited, it may be, for example, $1 \text{ }\mu\text{m}$ or more, $3 \text{ }\mu\text{m}$ or more, $5 \text{ }\mu\text{m}$ or more, $7 \text{ }\mu\text{m}$ or more, or $10 \text{ }\mu\text{m}$ or more. Additionally, the thickness of the first resin layer may be, for example, $50 \text{ }\mu\text{m}$ or less, $40 \text{ }\mu\text{m}$ or less, $30 \text{ }\mu\text{m}$ or less, or $20 \text{ }\mu\text{m}$ or less. That is, the thickness of the first resin layer may be, for example, $1 \text{ }\mu\text{m}$ or more and $50 \text{ }\mu\text{m}$ or less, $1 \text{ }\mu\text{m}$ or more and $40 \text{ }\mu\text{m}$ or less, $1 \text{ }\mu\text{m}$ or more and $30 \text{ }\mu\text{m}$ or less, $1 \text{ }\mu\text{m}$ or more and $20 \text{ }\mu\text{m}$ or less, $3 \text{ }\mu\text{m}$ or more and $50 \text{ }\mu\text{m}$ or less, $3 \text{ }\mu\text{m}$ or more and $40 \text{ }\mu\text{m}$ or less, $3 \text{ }\mu\text{m}$ or more and $30 \text{ }\mu\text{m}$ or less, $3 \text{ }\mu\text{m}$ or more and $20 \text{ }\mu\text{m}$ or less, $5 \text{ }\mu\text{m}$ or more and $50 \text{ }\mu\text{m}$ or less, $5 \text{ }\mu\text{m}$ or more and $40 \text{ }\mu\text{m}$ or less, $5 \text{ }\mu\text{m}$ or more and $30 \text{ }\mu\text{m}$ or less, $5 \text{ }\mu\text{m}$ or more and $20 \text{ }\mu\text{m}$ or less, $7 \text{ }\mu\text{m}$ or more and $50 \text{ }\mu\text{m}$ or less, $7 \text{ }\mu\text{m}$ or more and $40 \text{ }\mu\text{m}$ or less, $7 \text{ }\mu\text{m}$ or more and $30 \text{ }\mu\text{m}$ or less, $7 \text{ }\mu\text{m}$ or more and $20 \text{ }\mu\text{m}$ or less, $10 \text{ }\mu\text{m}$ or more and $50 \text{ }\mu\text{m}$ or less, $10 \text{ }\mu\text{m}$ or more and $40 \text{ }\mu\text{m}$ or less, $10 \text{ }\mu\text{m}$

or more and 30 μm or less, or 10 μm or more and 20 μm or less.

[0038] Although the thickness of the vapor deposition film is not particularly limited, it may be, for example, 10 nm or more, 20 nm or more, 30 nm or more, or 50 nm or more. Additionally, the thickness of the vapor deposition film may be, for example, 100 μm or less, 90 μm or less, 80 μm or less, or 70 μm or less. That is, the thickness of the vapor deposition film may be, for example, 10 nm or more and 100 nm or less, 10 nm or more and 90 nm or less, 10 nm or more and 80 nm or less, 10 nm or more and 70 nm or less, 20 nm or more and 100 nm or less, 20 nm or more and 90 nm or less, 20 nm or more and 80 nm or less, 20 nm or more and 70 nm or less, 30 nm or more and 100 nm or less, 30 nm or more and 90 nm or less, 30 nm or more and 80 nm or less, or 30 nm or more and 70 nm or less.

[0039] The vapor deposition film may be formed on only one surface of the first resin layer, or may be formed on both surfaces.

[0040] The outer bag may further have a second resin layer that is thicker than the first resin layer. The second resin layer may be, for example, a layer for the purpose of increasing the strength, increasing the sealing properties, etc. of the outer bag.

[0041] The resin material (second resin material) constituting the second resin layer may be, for example, a polyethylene-based resin (for example, linear low-density polyethylene (LLDPE), low-density polyethylene (LDPE), high-density polyethylene (HDPE), etc.), a polypropylene-based resin, a polyamide-based resin, a polyester-based resin, etc., and is preferably a polyethylene-based resin (for example, linear low-density polyethylene (LLDPE), low-density polyethylene (LDPE), high-density polyethylene (HDPE), etc.).

[0042] Although the thickness of the second resin layer is not particularly limited, it may be, for example, 10 μm or more, 30 μm or more, 50 μm or more, or 70 μm or more. Additionally, the thickness of the second resin layer may be, for example, 300 μm or less, 250 μm or less, 200 μm or less, or 150 μm or less. That is, the thickness of the second resin layer may be, for example, 10 μm or more and 300 μm or less, 10 μm or more and 250 μm or less, 10 μm or more and 200 μm or less, 10 μm or more and 150 μm or less, 30 μm or more and 300 μm or less, 30 μm or more and 250 μm or less, 30 μm or more and 200 μm or less, 30 μm or more and 150 μm or less, 50 μm or more and 300 μm or less, 50 μm or more and 250 μm or less, 50 μm or more and 200 μm or less, 50 μm or more and 150 μm or less, 70 μm or more and 300 μm or less, 70 μm or more and 250 μm or less, 70 μm or more and 200 μm or less, or 70 μm or more and 150 μm or less.

[0043] The ratio (T_2/T_1) of the thickness (T_2) of the second resin layer to the thickness (T_1) of the first resin layer may be, for example, 2 or more, 3 or more, 4 or more, or 5 or more. Additionally, (T_2/T_1) may be, for example, 20 or less, 15 or less, or 10 or less. That is, the ratio (T_2/T_1) may be, for example, 2 or more and 20 or less, 2 or more and 15 or less, 2 or more and 10 or less, 3 or more and 20 or less, 3 or more and 15 or less, 3 or more and 10 or less, 4 or more and 20 or less, 4 or more and 15 or less, 4 or more and 10 or less, 5 or more and 20 or less, 5 or more and 15 or less, or 5 or more and 10 or less.

[0044] The second resin layer may be provided on the vapor deposition film of the first resin layer or may be provided on the surface of the first resin layer on which the vapor deposition film is not formed.

[0045] The outer bag may further have a third resin layer for the purpose of increasing the mechanical strength, etc.

[0046] The resin material (third resin material) constituting the third resin layer may be, for example, a polyamide-based resin (for example, 6,6-nylon or 6-nylon), a polypropylene-based resin, a polyester-based resin, etc.

[0047] Although the thickness of the third resin layer is not particularly limited, it may be, for example, 1 μm or more, 3 μm or more, 5 μm or more, 7 μm or more, or 10 μm or more. Additionally, the thickness of the third resin layer may be, for example, 50 μm or less, 40 μm or less, 30 μm or less, or 20 μm or less. That is, the thickness of the third resin layer may be, for example, 1 μm or more and 50 μm or less, 1 μm or more and 40 μm or less, 1 μm or more and 30 μm or less, 1 μm or more and 20 μm or less, 3 μm or more and 50 μm or less, 3 μm or more and 40 μm or less, 3 μm or more and 30 μm or less, 3 μm or more and 20 μm or less, 5 μm or more and 50 μm or less, 5 μm or more and 40 μm or less, 5 μm or more and 30 μm or less, 5 μm or more and 20 μm or less, 7 μm or more and 50 μm or less, 7 μm or more and 40 μm or less, 7 μm or more and 30 μm or less, 7 μm or more and 20 μm or less, 10 μm or more and 50 μm or less, 10 μm or more and 40 μm or less, 10 μm or more and 30 μm or less, or 10 μm or more and 20 μm or less.

[0048] The coefficient of static friction between outer surfaces of the outer bag may be, for example, 0.15 or more, 0.2 or more, 0.25 or more, or 0.3 or more. As a result thereof, the packaging bodies will tend not to slip with respect to each other, so that multiple packaging bodies can be easily stacked and stored. Additionally, the coefficient of static friction between outer surfaces of the outer bag may be, for example, 0.7 or less, 0.6 or less, 0.5 or less, or 0.4 or less. As a result thereof, the stacked packaging bodies can easily be moved by being slid with respect to each other, so as to be exceptionally easy to handle. That is, the coefficient of static friction between outer surfaces of the outer bag may be, for example, 0.15 or more and 0.7 or less, 0.15 or more and 0.6 or less, 0.15 or more and 0.5 or less, 0.15 or more and 0.4 or less, 0.2 or more and 0.7 or less, 0.2 or more and 0.6 or less, 0.2 or more and 0.5 or less, 0.2 or more and 0.4 or less, 0.25 or more and 0.7 or less, 0.25 or more and 0.6 or less, 0.25 or more and 0.5 or less, 0.25 or more and 0.4 or less, 0.3 or more and 0.7 or less, 0.3 or more and 0.6 or less, 0.3 or more and 0.5 or less, or 0.3 or more and 0.4 or less.

[0049] The outer surface of the outer bag may be, for example, a first resin layer or a third resin layer, and is preferably a third resin layer. Due to the third resin layer constituting the outer surface, outside air can be prevented from infiltration due to damage to the first resin layer. Additionally, due to the third resin layer constituting the outer surface, the coefficient of

static friction mentioned above can be easily adjusted to be in a preferable range.

[0050] In the packaging body of the present embodiment, the inside of the outer bag may be deaerated. By deaerating the inside of the outer bag, the outer bag adheres to the inner bag, and the ease of handling increases.

[0051] The packaging body of the present embodiment may be produced, for example, by the production method below.

(Packaging body production method)

[0052] The production method of the present embodiment includes an accommodation step of air-blowing contents into an inner bag and accommodating the contents in the inner bag, a covering step of covering, with an outer bag, the inner bag accommodating the contents, and a deaeration step of deaerating the inside of the outer bag.

[0053] The air-blowing method and conditions in the accommodation step are not particularly limited, and for example, the air-blowing may be performed under known conditions using a known air-blowing apparatus.

[0054] In the covering step, the inner bag may be covered by the outer bag after closing the opening for blowing air that the inner bag has, so that the contents are not scattered from the opening for blowing air.

[0055] The method and conditions for deaeration in the deaeration step are not particularly limited, and for example, the deaeration can be performed by a method such as nozzle-type deaeration packaging. The pressure at the time of deaeration may be, for example, -10 kPa or less, -20 kPa or less, or -25 kPa or less. The lower limit of the pressure at the time of deaeration is not particularly limited. The pressure at the time of deaeration may be, for example, -70 kPa or more. That is, the pressure at the time of deaeration may be, for example, -70 kPa or more and -10 kPa or less, -70 kPa or more and -20 kPa or less, or -70 kPa or more and -25 kPa or less.

[0056] After the deaeration step, the opening of the outer bag is closed and sealed. The sealing method is not particularly limited, and may be, for example, sealing by heat-sealing, etc.

[0057] While preferred embodiments of the present invention have been explained above, the present invention is not limited to the embodiments above.

EXAMPLES

[0058] Hereinafter, the present invention will be explained in further detail by means of examples. However, the present invention is not limited to these examples.

[0059] As films for the outer bag used in the examples and the comparative examples, the films 1-4 below were prepared.

<Film 1>

[0060]

(Outer side) Resin layer (A)/Resin layer (B)/Resin layer (C) (Inner side)

Resin layer (A): Transparent barrier film (thickness 12 μm ; resin layer: polyethylene terephthalate; vapor deposition layer: alumina)

Resin layer (B): Stretched nylon film (thickness 15 μm)

Resin layer (C): Linear low-density polyethylene (thickness 80 μm)

<Film 2>

[0061]

(Outer side) Resin layer (A)/Resin layer (B)/Resin layer (C) (Inner side)

Resin layer (A): Transparent barrier film (thickness 12 μm ; resin layer: polyethylene terephthalate; vapor deposition layer: alumina)

Resin layer (B): Stretched nylon film (thickness 15 μm)

Resin layer (C): Linear low-density polyethylene (thickness 80 μm)

<Film 3>

[0062]

(Outer side) Resin layer (A)/Resin layer (B)/Resin layer (C) (Inner side)

Resin layer (A): Stretched nylon film (thickness 15 μm)

Resin layer (B): Transparent barrier film (thickness 12 μm ; resin layer: polyethylene terephthalate; vapor deposition layer: alumina)

Resin layer (C): Linear low-density polyethylene (thickness 80 μm)

<Film 4>

[0063]

(Outer side) Resin layer (A) (Inner side)

Resin layer (A): Linear low-density polyethylene (thickness 80 μm)

[0064] Regarding Films 1-4, the water vapor transmission rates, the oxygen transmission rates, and the coefficients of static friction of the outer surfaces were determined by the methods below. The results are indicated in Table 1.

<Measurement of water vapor transmission rate>

[0065] Measured in accordance with condition B (temperature 40 ± 0.5 °C, relative humidity $90 \pm 2\%$) in JIS Z 0208:1976.

<Measurement of oxygen transmission rate>

[0066] Measured in accordance with JIS K 7126-2:2006.

<Measurement of coefficient of static friction>

[0067] Two test pieces were prepared from each film by cutting out pieces with sizes of 16 cm $\times$ 6.2 cm. One of the test pieces was affixed to a 1 kg weight with the measurement surface (outer surface) on the outer side. The other test piece was affixed, with the measurement surface as the upper surface, to a frame that was horizontal with respect to the ground surface. A weight was placed on the frame so that the two test pieces came into contact. The frame was slowly tilted until the weight moved, and the inclination (θ) of the frame when the weight began to move was recorded. From the inclination (θ) of the frame, $\tan \theta$ was determined and defined as the coefficient of static friction.

[0068] Moisture absorption tests were performed on Films 1-4 by the method below. The results are indicated in Table 1.

<Moisture absorption test>

[0069] Each film was heat-sealed to prepare a bag having inner dimensions of 10 cm square. The bag was loaded with 10 g of dried carbon black (bulk density: 0.1 g/cm³; BET specific surface area: 300 m²/g), and sealed by heat-sealing. The sealed bag was placed at rest for 30 days in an environmental tester at 40 °C and 90% RH. The bag was unsealed and the water content of the extracted carbon black was measured. The measured water content was compared with the water content of the carbon black measured before sealing, and the water increase rate (% by mass/day) of the carbon black was calculated.

[0070] The water content of the carbon black was measured in compliance with JIS K 1469:2003.

[Table 1]

	Water Vapor Transmission Rate (g/m ² ·day)	Oxygen Transmission Rate (cc/m ² ·day·atom)	Visible Light Transmissi on Rate (%)	Coefficie nt of Static Friction	Water Increase Rate (% by mass/day)
Film 1	0.2	0.2	91	0.37	0.003
Film 2	0.2	0.2	91	0.34	0.004
Film 3	0.3	0.2	89	0.33	0.015
Film 4	3.3	3.4	83	0.17	0.110

(Example 1)

[0071] As the contents, carbon black (bulk density: 0.1 g/cm³; BET specific surface area: 300 m²/g) was prepared. As the inner bag, an inner bag (width 580 mm × length 1080 mm × height 200 mm; air permeability: 3.5 μm/(Pa·s)) made of kraft paper was prepared. As the outer bag, an outer bag made by heat-sealing Film 1 was prepared.

[0072] In the inner bag, 15 kg of carbon black were accommodated in the inner bag by air-blowing. The opening of the inner bag was folded and closed, and the inner bag was placed in the outer bag. The inside of the outer bag was deaerated at -30 kPa and the opening of the outer bag was heat-sealed to obtain a packaging body.

[0073] In the obtained packaging body, information printed on the inner bag was able to be easily discerned.

[0074] Additionally, a moisture absorption test was performed on the obtained packaging body by the method below. The results are indicated in Table 2.

<Moisture absorption test>

[0075] The packaging body was placed at rest for 3 months in an environmental tester at 40 °C and 90% RH. The packaging body was unsealed and the water content of the extracted carbon black was measured. The measured water content was compared with the water content of the carbon black measured before sealing, and the water increase rate (% by mass/day) of the carbon black was calculated.

[0076] The water content of the carbon black was measured in compliance with JIS K 1469:2003.

(Example 2)

[0077] A packaging body was obtained in a manner similar to that in Example 1, aside from the fact that Film 2 was used instead of Film 1. The obtained packaging body was checked regarding whether information printed on the inner bag was easily discernible. Additionally, a moisture absorption test similar to that in Example 1 was performed on the obtained packaging body. The results are indicated in Table 2.

(Example 3)

[0078] A packaging body was obtained in a manner similar to that in Example 1, aside from the fact that Film 3 was used instead of Film 1. The obtained packaging body was checked regarding whether information printed on the inner bag was easily discernible. Additionally, a moisture absorption test similar to that in Example 1 was performed on the obtained packaging body. The results are indicated in Table 2.

(Comparative Example 1)

[0079] A packaging body was obtained in a manner similar to that in Example 1, aside from the fact that only an inner bag was used, without using Film 1. A moisture absorption test similar to that in Example 1 was performed on the obtained packaging body. The results are indicated in Table 2.

(Comparative Example 2)

[0080] A packaging body was obtained in a manner similar to that in Example 1, aside from the fact that Film 4 was used instead of Film 1. A moisture absorption test similar to that in Example 1 was performed on the obtained packaging body. The results are indicated in Table 2.

[Table 2]

	Water Increase Rate (% by mass/3 months)
Example 1	0.1
Example 2	0.1
Example 3	0.1
Comparative Example 1	3.5
Comparative Example 2	1.1

Claims

1. A packaging body comprising an inner bag having air permeability, an outer bag covering the inner bag, and contents accommodated in the inner bag, wherein:

the outer bag has a water vapor transmission rate of 1 g/(m²·day) or less, an oxygen transmission rate of 1 cc/(m²·day·atom) or less, and a visible light transmission rate of 50% or more; and
the contents are carbon black having a bulk density of 0.3 g/cm³ or less.
2. The packaging body according to claim 1, wherein the inner bag has an air permeability of 1 μm/(Pa·s) or more.
3. The packaging body according to claim 1 or 2, wherein a BET specific surface area of the carbon black is 100 m²/g or more.
4. The packaging body according to claim 1 or 2, wherein the outer bag includes a resin layer having a vapor deposition film of an inorganic oxide formed on at least one surface thereof.
5. The packaging body according to claim 1 or 2, wherein the outer bag includes a first resin layer having a vapor deposition film of an inorganic oxide formed on at least one surface thereof, and a second resin layer containing a polyethylene-based resin.
6. The packaging body according to claim 1 or 2, wherein a coefficient of static friction between outer surfaces of the outer bag is 0.2 or more and 1 or less.
7. The packaging body according to claim 1 or 2, wherein a water content of the carbon black is 1 mass% or less.
8. The packaging body according to claim 1 or 2, wherein the inner bag is made of kraft paper.
9. The packaging body according to claim 1 or 2, wherein the inner bag comprises an opening for blowing air.
10. A production method for a packaging body including:

an accommodation step of air-blowing contents into an inner bag having air permeability and accommodating the contents in the inner bag;
a covering step of covering, with an outer bag, the inner bag accommodating the contents; and
a deaeration step of deaerating an inside of the outer bag;
wherein
the outer bag has a water vapor transmission rate of 1 g/(m²·day) or less, an oxygen transmission rate of 1 cc/(m²·day·atom) or less, and a visible light transmission rate of 50% or more; and
the contents are carbon black having a bulk density of 0.3 g/cm³ or less.
11. The production method according to claim 10, wherein the deaeration is deaeration by depressurization to -20 kPa or less.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2024/001444

A. CLASSIFICATION OF SUBJECT MATTER

B65D 77/04(2006.01)i

FI: B65D77/04 F

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65D77/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2024

Registered utility model specifications of Japan 1996-2024

Published registered utility model applications of Japan 1994-2024

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Y	WO 2020/100574 A1 (DENKA CO., LTD.) 22 May 2020 (2020-05-22) paragraphs [0020]-[0029]	1-11
Y	JP 10-265709 A (MITSUBISHI CHEMICAL CORPORATION) 06 October 1998 (1998-10-06) paragraph [0026]	1-11
Y	JP 2019-143000 A (SAKATA INX CORP.) 29 August 2019 (2019-08-29) claim 8, paragraphs [0003], [0073]	4-5
Y	JP 54-146198 A (NAGAE, Hiroshi) 15 November 1979 (1979-11-15) page 1, right column, line 14 to page 2, upper left column, line 1	8
A	JP 10-140032 A (MITSUBISHI CHEMICAL CORPORATION) 26 May 1998 (1998-05-26)	1-11

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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REFERENCES CITED IN THE DESCRIPTION

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