In addition, an object of the present invention is to provide a solid fuel that is capable of absorbing carbon dioxide at the time of being burned, and a carbon dioxide reduction method using the solid fuel.

In addition, an object of the present invention is to provide a solid fuel that is capable of absorbing carbon dioxide by being burned together with other fuel, and a carbon dioxide reduction method using the solid fuel.

The present invention has been made in view of the above problems, and an object thereof is to provide a wristband clip having the function of absorbing carbon dioxide, and a carbon dioxide reduction method using the wristband clip.

In addition, an object of the present invention is to provide a wristband clip that is capable of absorbing carbon dioxide at the time of being incinerated, and a carbon dioxide reduction method using the wristband clip.

In addition, an object of the present invention is to provide a wristband clip that is capable of absorbing carbon dioxide by incinerating the wristband clip together with an object of attaching such as a wristband, and a carbon dioxide reduction method using the wristband clip.

{Solution to Problem}

That is, the present invention has been made focusing on, in a manufacturing step of a label or a sticker, addition of a carbon dioxide absorbent to the material thereof or lamination of the carbon dioxide absorbent on the material.

According to a first aspect of the present invention, there is provided an information-bearing medium comprising a medium body and capable of bearing information on the medium body, wherein the medium body has a structure including at least two layers, and a carbon dioxide absorbent, which absorbs carbon dioxide during incineration of the information-bearing medium, is added to any one of the layers.

According to a second aspect of the present invention, there is provided an information-bearing medium comprising a medium body and capable of bearing information on the medium body, wherein the medium body has a structure including at least two layers, and a layer of a carbon dioxide absorbent, which absorbs carbon dioxide during incineration of the information-bearing medium, is laminated on any one of the layers.

According to a third aspect of the present invention, there is provided a carbon dioxide reduction method using an information-bearing medium, the method comprising: preparing an information-bearing medium having a medium body with a structure including at least two layers, wherein a carbon dioxide absorbent is added to any one of the layers of the medium body capable of bearing information; and incinerating the information-bearing medium to allow the carbon dioxide absorbent to absorb carbon dioxide.

According to a fourth aspect of the present invention, there is provided a carbon dioxide reduction method using an information-bearing medium, the method comprising: preparing an information-bearing medium having a medium body with a structure including at least two layers, wherein a layer of a carbon dioxide absorbent is laminated on any one of the layers of the medium body capable of bearing information; and incinerating the information-bearing medium to allow the carbon dioxide absorbent to absorb carbon dioxide.

According to a fifth aspect of the present invention, there is provided a label comprising: a label substrate; and an adhesive layer applied to a rear surface of the label substrate, wherein a carbon dioxide absorbent, which absorbs carbon dioxide during incineration of the label, is added to at least any one of the label substrate and the adhesive layer.

According to a sixth aspect of the present invention, there is provided a label comprising: a label substrate; and an adhesive layer applied to a rear surface of the label substrate, wherein a layer of a carbon dioxide absorbent, which absorbs carbon dioxide during incineration of the label, is laminated on at least any one of the label substrate and the adhesive layer.

According to a seventh aspect of the present invention, there is provided a label comprising: a label substrate formed of a paper material; and an adhesive layer applied to a rear surface of the label substrate, wherein a carbon dioxide absorbent, which absorbs carbon dioxide during incineration of the label, is added to the adhesive layer.

According to an eighth aspect of the present invention, there is provided a label comprising: a label substrate; an adhesive layer applied to a rear surface of the label substrate; and a backing paper temporarily attached to the adhesive layer, wherein a carbon dioxide absorbent, which absorbs carbon dioxide during incineration of the label, is added to any one of the label substrate, the adhesive layer and the backing paper.

According to a ninth aspect of the present invention, there is provided a carbon dioxide reduction method using a label, the method comprising: preparing a label comprising a label substrate and an adhesive layer applied to a rear surface of the label substrate, in which a carbon dioxide absorbent is added to any one of the label substrate and the adhesive layer; and incinerating the label to allow the carbon dioxide absorbent to absorb carbon dioxide.

According to a tenth aspect of the present invention, there is provided a carbon dioxide reduction method using a label, the method comprising: preparing a label having a label substrate and an adhesive layer applied to a rear surface of the label substrate, in which a carbon dioxide absorbent layer is laminated on any one of the label substrate and the adhesive layer; and incinerating the label to allow a carbon dioxide absorbent of the carbon dioxide absorbent layer to absorb carbon dioxide.

According to an eleventh aspect of the present invention, there is provided a thermal transfer ink ribbon used for printing on a printing sheet, wherein a carbon dioxide absorbent is added to any one of layers of the thermal transfer ink ribbon, wherein the thermal transfer ink ribbon does not include, in an ink receiving layer thereof, zeolite into whose structure an antibacterial ion is taken.

According to a twelfth aspect of the present invention, there is provided a thermal transfer ink ribbon used for printing on a printing sheet, wherein a layer of a carbon dioxide absorbent is laminated on any one of layers of the thermal transfer ink ribbon, wherein the thermal transfer ink ribbon does not include, in an ink receiving layer thereof, zeolite into whose structure an antibacterial ion is taken.

According to a thirteenth aspect of the present invention, there is provided a carbon dioxide reduction method using a thermal transfer ink ribbon, the method comprising: preparing a thermal transfer ink ribbon used for printing on a printing sheet, the thermal transfer ink ribbon including a carbon dioxide absorbent in any one of layers of the thermal transfer ink ribbon; and incinerating the thermal transfer ink ribbon to allow the carbon dioxide absorbent to absorb carbon dioxide.

According to a fourteenth aspect of the present invention, there is provided a carbon dioxide reduction method using a thermal transfer ink ribbon, the method comprising: preparing a thermal transfer ink ribbon used for printing on a printing sheet, wherein a layer of a carbon dioxide absorbent is laminated on any one of layers of the thermal transfer ink ribbon; and incinerating the thermal transfer ink ribbon to allow the carbon dioxide absorbent to absorb carbon dioxide.

In the present application, a~~A~~ first invention provides a label having a label substrate and an adhesive layer applied to the rear surface of the label substrate, wherein a carbon dioxide absorbent is added to at least any one of the label substrate and the adhesive layer.

A second invention provides a label having a label substrate and an adhesive layer applied to the rear surface of the label substrate, wherein a carbon dioxide absorbent layer is laminated on at least any one of the label substrate and the adhesive layer.

A third invention provides a label having a label substrate, an adhesive layer applied to the rear surface of the label substrate, and a backing paper temporarily attached to the adhesive layer, wherein a carbon dioxide absorbent is added to at least any one of the label substrate, the adhesive layer and the backing paper.

First, the carbon dioxide-absorbing substance and the dispersion aid are mixed with water or an organic solvent, and the mixture is subjected to any of the supercritical fluid treatment, the ultrasonic irradiation treatment and the stirring treatment to produce a carbon dioxide-absorbing substance dispersion liquid. Herein, if the carbon dioxide-absorbing substance is uniformly dispersed, the mixture has transparency.

A mixing ratio of the dispersion aid to 100 parts by weight of the carbon dioxide-absorbing substance is preferably 0.1 to 10 parts by weight. The mixing ratio of the dispersion aid is most preferably 0.1 to 5 parts by weight.

The reason for the ranges is because if the amount of the dispersion aid added to the carbon dioxide-absorbing substance is smaller than the ranges, the carbon dioxide-absorbing substance is not sufficiently dispersed in the carbon dioxide-absorbing substance dispersion liquid which is a mixture to be produced. Eventually, the dispersibility of the carbon dioxide-absorbing substance in the resin to be mixed is deteriorated, and the amount of carbon dioxide absorbed is made smaller.

In addition, the reason for the ranges is because if the amount added is larger than the ranges, a carbon dioxide-absorbing substance dispersion liquid having the carbon dioxide-absorbing substance in a sufficient concentration is not obtained, and the amount added becomes larger in order to satisfy the required concentration of the carbon dioxide-absorbing substance dispersant added to the resin, thereby making kneading difficult.

In the case where the supercritical fluid treatment is performed, it is preferably performed at a ~~temperature~~ pressure of 7.37 MPa or more for 1 minute to 12 hours while the mixture being warmed to a temperature of 30.98°C or higher under carbon dioxide, and most preferably at a temperature of 60°C to 120°C for 10 minutes to 1 hour.

Herein, a particle size distribution measurement is performed at the exposure times in the supercritical fluid treatment at a treatment temperature of 60°C and a treatment pressure of 20 MPa, and the results are used to calculate an average particle size at each exposure time. Figure 45 shows a relationship between the exposure time and the average particle size obtained from the results.

In the case where the exposure time is shorter than 10 minutes, that is, the cases where the exposure time of 0.1 minutes, 0.5 minutes and 1 minute, dispersibility of the carbon dioxide-absorbing substance to the dispersion aid is insufficient to cause

Hereinafter, the present invention is described with reference to Production Examples in more detail. It is to be noted that the present invention is not limited to these Production Examples at all.

(Production Example 1)

A high-pressure stainless vessel kept at 60°C was charged with 100 parts by weight of calcium hydroxide as the carbon dioxide-absorbing substance, 1 part by weight of calcium 12-hydroxystearate as the dispersion aid and 20 parts by weight of ion exchange water and ~~stickered~~sealed, and a supercritical treatment, in which carbon dioxide was injected so that the pressure was 20 MPa to be made in a supercritical state, the content of the vessel was stirred and mixed for 15 minutes while the temperature and pressure being kept, and carbon dioxide was discharged to return to atmospheric pressure, was performed, thereby obtaining a carbon dioxide-absorbing substance dispersion liquid. Then, a stirring treatment was performed by a mixer for 15 minutes while 30 parts by weight of the carbon dioxide-absorbing substance dispersion liquid were being sprayed to 100 parts by weight of a low density polyethylene resin (Moretec 0168N produced by Prime Polymer Co., Ltd.,) at a rate of 100 ml/min. The resultant was dried in vacuum to remove a water content, and kneaded by a twin-screw extruder having a screw inner diameter of 30 mm, thereby obtaining a pellet-like carbon dioxide absorbent.

In addition, a resin composition obtained by performing the entire process in Production Example 1 except for the supercritical treatment process was referred to as Comparative Production Example 1.

(Production Example 2)

The supercritical treatment in Production Example 1 was performed with calcium hydroxide as the carbon dioxide-absorbing substance being changed to calcium oxide, and the obtained carbon dioxide-absorbing substance dispersion liquid was added to a low density polyethylene resin, thereby obtaining a pellet-like carbon dioxide absorbent.

In addition, a resin composition obtained by performing the entire process in Production Example 2 except for the supercritical treatment process was referred to as Comparative Production Example 2.

(Production Example 3)

substance added to the resin can be reduced, thereby enabling to considerably extend applications without impairing the inherent characteristics of resin, such as lightness in weight and easiness in molding.

Furthermore, the carbon dioxide-absorbing substance added can be appropriately selected depending on applications to thereby produce a carbon dioxide absorbent light in weight and high in impact resistance.

The carbon dioxide absorbent for use in the present invention is preferably sodium aluminosilicate.

The sodium aluminosilicate is preferably encapsulated in a phospholipid.

The sodium aluminosilicate is preferably contained in a ribosome.

Hereinafter, Production Examples of the carbon dioxide absorbent especially suitable for the present invention is described.

Adjustment of Carbon Dioxide Absorbent

In 130 g of water were dissolved 6 g of sodium aluminate (produced by Wako Pure Chemical Industries Ltd., special grade) and 30 g of sodium silicate (produced by Wako Pure Chemical Industries Ltd., special grade), and stirred at 30°C for 60 minutes. After the stirring, amorphous sodium aluminosilicate was produced by centrifugal separation.

Adjustment of NVC (liposome)

A liposome containing the amorphous sodium aluminosilicate (carbon dioxide absorbent) was prepared by a supercritical reverse phase evaporation method and an apparatus disclosed in the following supercritical reverse phase evaporation method publications *.

(*Japanese National Republication of International Patent Application No. 02/032564, Japanese Patent Application Laid-Open No. 2003-119120, Japanese Patent Application Laid-Open No. 2005-298407 and Japanese Patent Application Laid-Open No. 2008-063284)

Specifically, a high-pressure stainless vessel kept at 60°C was charged with 0.15 to 0.35 parts by weight of sodium aluminosilicate having an average particle size of 10 to 500 nm, 5 parts by weight of phosphatidylcholine as a phospholipid and 100 parts by weight of ion exchange water and ~~stickered~~sealed, and a supercritical treatment, in which carbon dioxide was injected so that the pressure was 20 MPa to be made in a