

Frequently asked questions on polyvinylidene chloride products

PVDC Q&A

Ver. **2**



Cling wrap

This document contains FAQs on the products of members of the Japan Hygienic Association of Vinylidene Chloride.

Q01
Question

When did the use of polyvinylidene chloride start?

A

The Dow Chemical Company in the United States started to produce polyvinylidene chloride as a synthetic fiber around 1940. In Japan, polyvinylidene chloride was domestically produced for the first time in 1953, and the production of casing film and cling wrap began in 1956 and 1960, respectively.



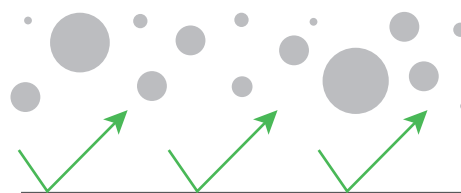
Q02
Question

What are the advantages and applications of polyvinylidene chloride?

A

The strongest point about polyvinylidene chloride is its excellent barrier property (gas non-permeable property) against both oxygen and moisture, and its oxygen barrier property is maintained even at a high humidity. These are advantages that are not found with other resins. Taking advantage of such an excellent barrier property, polyvinylidene chloride has been used for a wide range of usual products, like packaging film for ham,

sausage, cheese and other preserved food, as well as household-use cling wrap. It has also been used as a coating agent to provide a barrier property to paper or other types of plastic film. (See the coated film section of coating agents.)



Q03
 uestion

What are the main characteristics of different materials used for cling wrap for food packaging?

A

See the comparison table of cling wrap materials.

Comparison table of the characteristics of various cling wrap materials

Numbers in parentheses express the corresponding values in SI units. (mol/m²·s·Pa)

Materials	Item	Average thickness	Heatproof temperature ^(※1)	Oxygen permeability ^(※2)	Moisture permeability ^(※3)
	Test method	JIS	Tokyo Metropolitan Consumer Regulations	ASTM ^(※4)	ASTM
	Test condition	—	—	23°C·65%RH	38°C·90%RH
	Unit	μm	°C	cm ³ /m ² ·day·MPa	g/m ² ·day
Polyvinylidene chloride wrap	11	140	592 (280×10 ⁻¹⁵)	12	
Polyethylene wrap	10	110	128,000 (61,000×10 ⁻¹⁵)	30	
Polyvinyl chloride wrap	8	130	148,000 (70,000×10 ⁻¹⁵)	150<	

(※1) Larger numbers represent higher heat resistance.

(※2) Smaller numbers represent lower oxygen permeability.

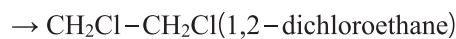
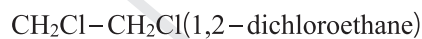
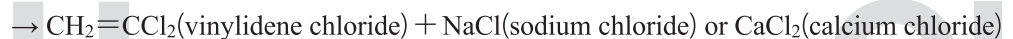
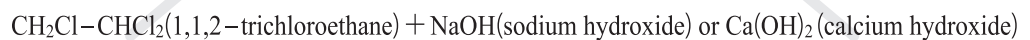
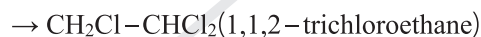
(※3) Smaller numbers represent lower moisture permeability.

(※4) American Society for Testing and Materials

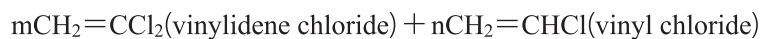
Q04
 uestion

How and from which raw materials is polyvinylidene chloride made?
A

Vinylidene chloride is first made from chlorine obtained by electrolysis of salt (sodium chloride) and ethylene obtained by pyrolysis of petroleum.

1. Production of 1,2-dichloroethane

2. Production of vinyl chloride

3. Production of vinylidene chloride


It is then copolymerized with vinyl chloride or other monomers to produce polyvinylidene chloride.

4. Production of polyvinylidene chloride

Q05
 uestion

What is the difference between polyvinylidene chloride and vinyl chloride although their names are similar?
A

Although the names *polyvinylidene chloride* and *polyvinyl chloride* seem similar, the difference in polymer molecular

structure greatly affects the gas barrier, heat resistance and other physical properties.

Q06 Question

How is the safety of polyvinylidene chloride products ensured?

A

Vinylidene chloride products are produced in accordance with the European Union (EU), U.S. Food and Drug Administration (FDA) and other regulations on food packaging materials.

Under the Japanese Food Sanitation Act, general standards and standards for individual materials have been set for plastic utensils, containers and packages for food.

To supplement these standards, plastic-related industries are ensuring the safety of food packaging materials by setting voluntary standards for individual materials.

The voluntary standards of the Japan

Hygienic Association of Vinylidene Chloride for polyvinylidene chloride consist of voluntary standard values, hygiene test methods and a positive list.

The positive list is a list of raw materials and additives that can be used for food packaging plastics based on safety assessment. In case of polyvinylidene chloride products, such substances are selected from those allowed by the latest food hygiene laws and regulations of Japan, the US and EU. Each member of Japan Hygienic Association of Vinylidene Chloride ensures the safety of polyvinylidene chloride food utensils/containers/packages in accordance with these voluntary standards.

Q07 Question

What kinds of additives are used for polyvinylidene chloride cling wrap?

A

For cling wrap for home use that is made from polyvinylidene chloride, softening and stabilizing agents are used as additives. Additives registered by the voluntary standards of the Japan

Hygienic Association of Vinylidene Chloride and certified by the European Union (EU) or U.S. Food and Drug Administration (FDA) for food packaging plastics are used.

Q08 Question

What points should be noted when disposing of polyvinylidene chloride?

A

Follow the waste regulations of the individual countries.

Q09
question

Is it safe if a small piece of polyvinylidene chloride is eaten together with food by accident?

A

Polyvinylidene chloride is excreted without being digested or absorbed in the body. The safety of the additives has also been checked.

Q10
question

Why do the precautions for use of polyvinylidene chloride cling wrap state, "Do not microwave while in direct contact with oily food" ?

A

If oily, deep-fried or other cooked food that is in direct contact with cling wrap is microwaved, the heatproof temperature limit of the film may be exceeded and

the film may break. In such a case, place food in a deep, heatproof container and cover it with cling wrap so that it is not in direct contact with food.

Q11
question

What does the W-shaped marking on polyvinylidene chloride and other cling wrap packages mean?

A

The marking was introduced in 1998 to allow visually disabled people to distinguish it from aluminum foil or other products in similarly shaped packaging.

W-shaped marking on a package





Coated film

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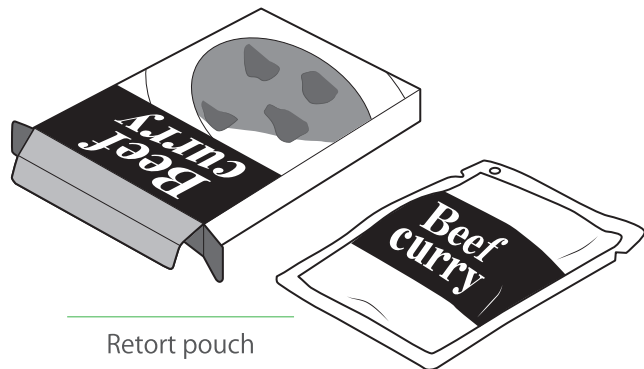
Q01
uestion

What kinds of food packaging methods involving coated plastic film are there?

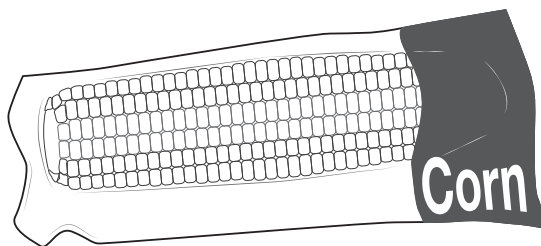
A There are various food packaging methods using plastic film. Polyvinylidene chloride-coated film belongs to the area of barrier packaging, which can extend the quality retaining period (shelf life) of the packaged food.



Zipper pouch



Retort pouch



Vacuum package



Spout pouch

Q02 Question

What kind of performance is required of food packaging materials?

A

The three major functions required of food packaging materials are as follows:

1. Protection of the content
2. Convenience of handling
3. Information provision

Packaging materials have a protective function to improve the preservability and extend the shelf life of food. With certain packaging materials it is also

easier to remove the content or to provide re-sealability of the packages. They are also used to display information on cooking methods, nutritional components, serving suggestions, etc. about the food/products. Such functions are expected of food packaging.

Q03 Question

Since when and how has polyvinylidene chloride been used?

A

To provide the moisture-proofing and gas-barrier properties, polyvinylidene chloride-coated cellophane for candy wrapping was introduced in 1963 and polyvinylidene chloride-coated polypropylene film was introduced later in the 1960s for

confectionery and other wrapping. In the 1970s, polyvinylidene chloride coating was also adopted for polyethylene phthalate (PET) and polyamide (Nylon) film, making it possible to use such film for heavier goods and for boil and retort packaging.

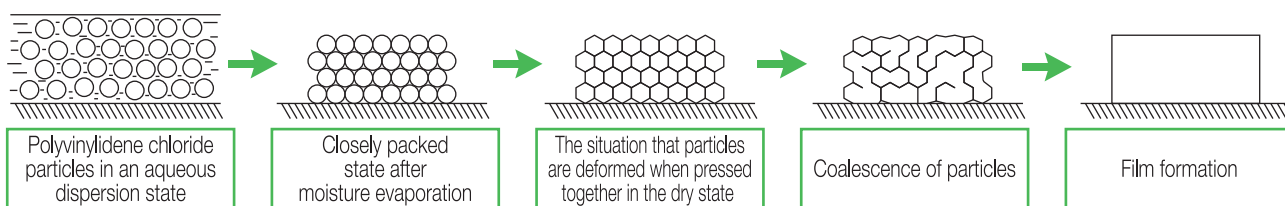
Q04 Question

What kinds of polyvinylidene chloride coating agents are there and what are their characteristics?

A

There are latex (underwater dispersing liquid of minute polyvinylidene chloride particles) and resin (polyvinylidene chloride powder resolved in a solvent) coating agents.

These agents are applied to the film to form a coating when it has dried and make the film less oxygen- and water-permeable.



Changes in the status of polyvinylidene chloride particles due to water and solvent evaporation

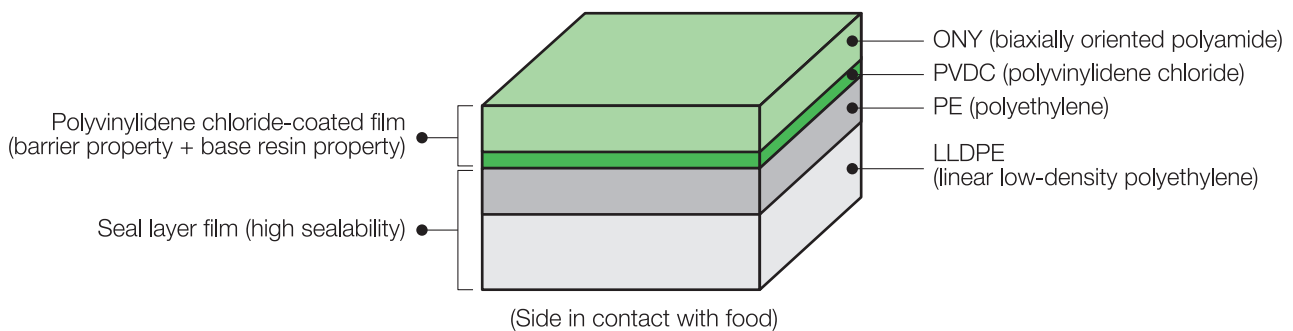
Q05 Question

What kind of structure does polyvinylidene chloride coated film have?

A

It is a collective term for film that is thinly coated with polyvinylidene chloride. In general, a film layer that gives sealability

is laminated on the coating surface. An example of the cross section of the packaging film is shown in the following figure.



Cross section of polyvinylidene chloride-coated film

Q06 Question

What are the advantages of polyvinylidene chloride-coated film?

A

Polyvinylidene chloride-coated film has the following advantages.

1. It can maintain a stable gas barrier property against outside humidity changes.
2. It also has a moisture barrier property.
3. It has an excellent food aroma retention property.
4. It has excellent wear- and bending-resistant properties.

Q07 Question

How is the hygiene of coating agents and coated film checked?

A

Regulations of individual countries are observed.

The Japan Hygienic Association of Vinylidene Chloride issues a “confirmation

certificate” for coating agents and coated film that have been checked to meet its voluntary standards. (See Q06 of the cling wrap/casing film section.)

Q08
Question

What kind of equipment is used to produce polyvinylidene chloride-coated film?

A Polyvinylidene chloride-coated film is produced by applying polyvinylidene chloride coating agents to plastic film and then drying it. Figure 1 shows the schematic diagram of a typical

polyvinylidene chloride coater. Air knife (Fig. 2) or reverse gravure (Fig. 3) coaters are usually used for industrial coating agent applications.

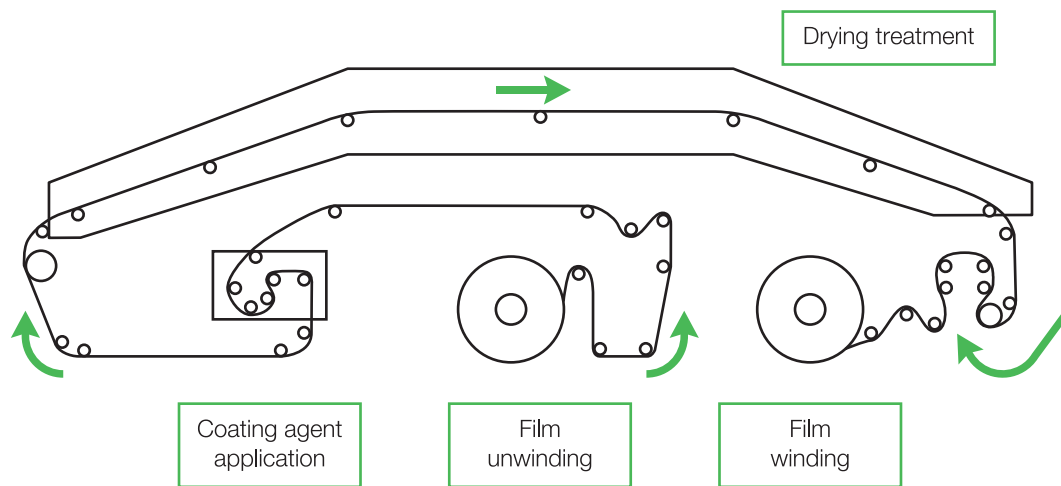


Fig.1 Schematic diagram of a polyvinylidene chloride coater

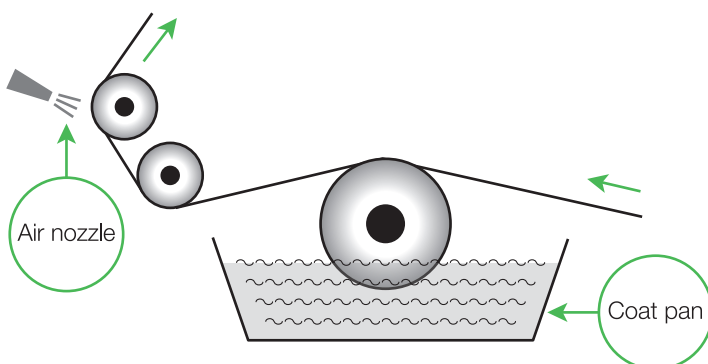


Fig.2 Air knife coater

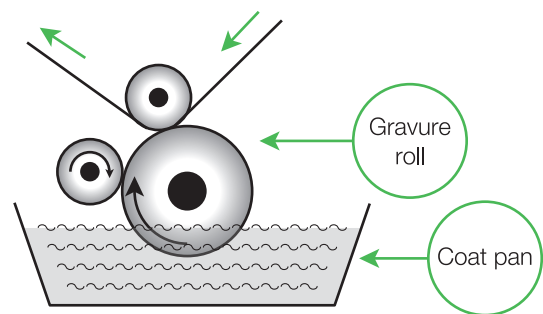


Fig.3 Reverse gravure coater

Q09
Question

What kind of quality tests are conducted for polyvinylidene chloride-coated film?

A

Polyvinylidene chloride-coated film has the property of being impermeable to oxygen and vapor (moisture). Since packaging with this film protects food from oxidization and decay, food preservability can be improved.

It can also be used for products of various shapes and usages as it is highly resistant to breakage, bending, abrasion, piercing and other damage.

Test items to check if the performance of the coated film is stable include:

- The amount of oxygen or moisture that can pass through the film in a certain environment in a certain period
- Changes in oxygen/moisture permeability by mechanically reproducing the states of breakage, bending, abrasion and piercing

Q10
Question

How much environmental burden does polyvinylidene chloride-coated film have compared with film made of other materials?

A

Polyvinylidene chloride is a coating agent that can achieve a high quality food preservation effect.

For example, the oxygen permeability of film thinly coated with polyvinylidene chloride is decreased by several to several hundred times. Film that is several to several hundred times thicker is necessary to obtain an equal level of oxygen barrier property (property not allowing oxygen to pass) if polyvinylidene chloride coating is not used.





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