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**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

SN/T 5232-2019

**Food Contact Materials Testing of Modified Atmosphere
Packaging for Fresh Cut Products**

食品接触材料 鲜切制品气调包装的检测

(English Translation)

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Foreword

This standard is compiled in accordance with the rules given in GB/T 1.1-2009.

This standard was proposed and managed by the General Administration of Customs of the People's Republic of China.

Drafting organizations of this standard. Qingdao Customs of the People's Republic of China, China National Accreditation Center for Conformity Assessment, People's Republic of China Stone Jiazhuang Customs.

1 Scope

This standard specifies the principle of modified atmosphere packaging that comes into contact with food, the composition and ratio of commonly used modified atmosphere gases,

mixed gases, and suppression actions.

Use and type.

This standard applies to modified atmosphere packaging for fresh or fresh-cut products.

2 Terms and definitions

The following terms and definitions apply to this document.

2.1 Modified atmosphere packaging/(MAP)

By changing the atmosphere inside the package, the food is placed in an atmosphere that is different from the air component (78.8% N₂, 20.96% O₂, 0.03% CO₂) the packaging with extended shelf life is referred to as MAP.

3 Principle

Use modified atmosphere fresh-keeping gas to replace the air in the packaging box or packaging bag, change the external environment of the food in the box (bag), and restrain the growth and reproduction of bacteria (microorganisms) slows down the metabolism of fresh fruits and vegetables, thereby prolonging the freshness or shelf life of food. To fruit Take fresh vegetables as an example. Fresh fruits and vegetables still undergo respiration after being picked, consume O₂ to produce CO₂, and gradually increase the CO₂ content in the environment and reduce the concentration of O₂, the use of high-permeability plastic film can exchange gas with the atmosphere, replenish the consumed O₂ and discharge CO₂.when when the rate of gas penetration into the film is equal to the breathing rate of fruits and vegetables, the gas in the packaging bag reaches a certain equilibrium concentration, which can maintain the fruits and vegetables.

The weak respiration speed does not produce anaerobic respiration, thereby delaying the ripening of fruits and vegetables and keeping them fresh. The use of modified atmosphere packaging can achieve Use preservatives and additives to ensure the taste, nutrients and shelf life of the food.

4.1 Carbon dioxide (CO₂)

Carbon dioxide (CO₂) has the effect of inhibiting the growth and reproduction of most spoilage bacteria and molds, and can extend the incubation period of bacterial growth (Or stagnation period), it is the main antibacterial agent in the fresh-keeping gas;

4.2 Oxygen (O₂)

O₂ can inhibit the growth and reproduction of most anaerobic spoilage bacteria, maintain the color of fresh meat, and maintain the freshness of fresh fruits and vegetables the role of

respiratory metabolism.

4.3 Nitrogen (N₂)

Nitrogen is stable in nature. The use of nitrogen is generally to eliminate oxygen, thereby slowing down the oxidation and respiration of food. Nitrogen it also has a certain inhibitory effect on the growth of bacteria. In addition, nitrogen is basically insoluble in water and oil, and food has little adsorption effect on nitrogen.

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It will not shrink gradually due to the absorption of gas during installation.

4.4 Argon (Ar)

Argon is the same colorless and odorless inert gas as nitrogen, but the mass of argon is heavier than nitrogen and its solubility is twice that of nitrogen. It can replace nitrogen as a mixture Gas filling gas. It is generally believed that argon and nitrogen have no inhibitory effect on microorganisms, but recent experimental studies have shown that argon has obvious antibacterial effects.

Use, because microorganisms are sensitive to Ar and change the membrane flow characteristics of microbial cells to affect their functions. In addition, argon atoms are similar in size Oxygen, density is greater than oxygen, and solubility is higher, so argon can displace oxygen from the oxygen receiver of plant cells and enzymes, thereby inhibiting the oxidation reaction and slow down the metabolic rate of breathing.

4.5 Sulfur Dioxide (SO₂)

SO₂ non-binding non-ionic molecules have an antibacterial effect, which can inhibit the reproduction of soft fruit molds and bacteria (especially grapes and dried grapes).

Fruit), it can also inhibit the bacteria in fruit juice, liquor, shrimp and kimchi. The inhibitory effect of SO₂ on different microorganisms is related to the concentration. SO₂ suppression Gram-negative bacteria such as Escherichia coli and Garmonas are more effective than Gram-positive bacteria such as lactobacillus.

5.1 Composition

The mixed gas of the modified atmosphere packaging is composed of two or three kinds of gases among the three gases of CO₂, O₂, and N₂. The volume of each gas the percentage is called the gas mixture ratio, which is generally 78.8% N₂, 20.96% O₂, and 0.03% CO₂.

5.2 Proportion

The ratio of mixed gas for modified atmosphere packaging should be selected according to the type of food and preservation requirements. Table 1 is several kinds of foreign food modified atmosphere packages the mixed gas composition and the gas mixing ratio. Table 2 shows the mixed gas composition and storage period of several domestic food modified atmosphere packaging.

6 Inhibition of modified atmosphere packaging

6.1

The role of inhibiting spoilage microorganisms when CO₂ exceeds 5% (v/v) in the air-conditioned atmosphere, many food spoilage microorganisms can be inhibited to a certain extent, especially in many cold storages.

Food breeds psychrophilic bacteria. Spoilage microorganisms such as *Pseudomonas*, *Pseudomonas/Moraxella*, etc., which are common in fresh meat and poultry, are quickly CO₂ suppression.

6.2 Inhibition of pathogenic bacteria

High-concentration CO₂ is effective in inhibiting *Staphylococcus aureus*, *Salmonella*, *Escherichia coli*, *Yarrowia intestinal* bacteria, and the inhibitory effect varies with the temperature rises and decreases.

7.1 Large packaging

Large packaging is mainly used for pallet packaging and cardboard box packaging during transportation and storage. These materials are relatively environmentally friendly and can be recycled.

Collect and use.

7.2 Pre-packaging

Pre-packaging is mainly used in the sales link of products, and the retailer or the customer themselves use the modified atmosphere pre-packaging for packaging. Pre-packaged pass Commonly used film materials include low-density polyethylene (LDPE), polyvinyl chloride (PVC), polypropylene (PP), these films can help prevent the loss of moisture ensures the quality of the product.