Avena Lab
Farmadria d.o.o. Since 1991.

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PRODUCT SPECIFICATION

Material Specifications Used in Glass Packaging

Regulations and Standards on Glass Quality

Regulations and standards on glass quality can cover various aspects, such as material safety, purity, chemical resistance, physical properties, and the potential release of harmful substances from the glass into the product. In the European Union, for example, the general requirements for cosmetic product packaging are defined by the Cosmetic Products Directive (EC No 1223/2009), which includes materials for packaging, such as glass. Specific regulations on glass quality can also be found in standards set by international organizations such as the International Organization for Standardization (ISO) and Pharmacopoeias (e.g., USP in the United States, EP in Europe). These standards can specify detailed specifications for the types of glass that can be used, testing to be conducted to ensure compatibility and safety, as well as guidelines for packaging and labeling.

Chemical Composition of Glass

The chemical composition of glass used for making cosmetic glass packaging can vary depending on its purpose and desired properties, but most types of glass are made from three basic materials: silicon dioxide (SiO2), sodium carbonate (Na2CO3), and lime (CaO). These ingredients together form what is commonly known as "soda-lime glass," which is the most common type of glass used in the production of cosmetic glass packaging. Here's a more detailed look at the basic chemical composition of glass and the functions of its components:

Basic Ingredients

Silicon dioxide (SiO2) or alpha-quartz is the main component of glass. It is obtained from quartz sand. Silicon dioxide gives glass its basic structure and makes it hard and resistant to chemical degradation. Sodium carbonate (Na2CO3) or soda ash is an ingredient that lowers the melting point of silicon dioxide, making it easier to process. Soda ash also helps make the glayss less brittle and facilitates shaping during production. Lime (CaO): Obtained from limestone, it is used to stabilize the glass mass, adding durability and water resistance.

Additional Ingredients

Depending on specific needs, other materials can be added to the glass to modify its color, transparency, heat resistance, and other characteristics.

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Boric acid (B2O3): Added for the production of borosilicate glass, which is known for its high resistance to thermal shock. This glass is often used for laboratory equipment and household items that need to withstand high temperatures.

Aluminum oxide (Al2O3): Increases the hardness and durability of the glass, often added to glass that needs to withstand extreme use conditions.

Metal oxides (Fe2O3, Cr2O3, MnO2, etc.): Added in small quantities to change the color of the glass. For example, adding iron oxide results in green or brown glass, while adding cobalt oxide (CoO) produces blue glass.

The chemical composition of glass can be very specific and tailored for specific applications, allowing manufacturers to create products with precisely defined physical and aesthetic properties.

Presence of Heavy Metals in Glass

The presence of heavy metals such as lead, cadmium, and arsenic in glass, especially in packaging for food and beverages, as well as in cosmetic packaging, poses a potential health risk due to the possibility of these metals migrating from the packaging into the final product content. Heavy metals can be toxic and cause various health problems in humans.

Migration of Heavy Metals

Migration mechanism: The migration of heavy metals from glass can occur under certain conditions. The amount of migrating particles usually depends on the composition of the glass, as well as on the exposure conditions.

Lead (Pb): Lead is a neurotoxin that can cause a wide range of health problems, especially in children, including brain and nervous system damage, decreased IQ, learning difficulties, and behavioral problems. In adults, exposure to lead can lead to reproductive system problems, hypertension, and kidney issues.

Cadmium (Cd): Cadmium can cause serious damage to the kidneys, bones, and respiratory system. It is also classified as a human carcinogen.

Antimony (Sb): Exposure to antimony can lead to skin, eye, and respiratory system irritation. At high levels of exposure, antimony can cause cardiovascular and pulmonary problems.

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Arsenic (As): Arsenic is known to cause skin lesions, peripheral neuropathies, gastrointestinal symptoms, diabetes, cardiovascular diseases, and cancer.

Chromium (Cr): Chromium(VI) or hexavalent chromium is particularly toxic and carcinogenic. It can cause dermatitis, skin ulcers, damage to the nasal mucosa and lungs, and increase the risk of lung cancer.

Regulation and Control

Regulation and Control Due to potential health risks, the production of glass packaging is regulated by strict regulations that limit the amount of heavy metals that can be present in glass intended for contact with food or cosmetic products. There are also standards that define permissible levels of heavy metal migration from packaging into cosmetic products.

Prevention of Migration Avoiding the use of heavy metals:

One way to reduce the risk of heavy metal migration is by avoiding their use in glass production. This can be achieved by using alternative materials that do not contain heavy metals.

Using barrier layers: In some cases, a special layer or coating can be applied to the inside of the glass packaging to prevent heavy metal migration. These layers act as a barrier between the content and the glass.

Monitoring and Testing Strict monitoring and testing:

Regular testing of glass packaging for the presence of heavy metals and their potential for migration is key to ensuring safety. Packaging manufacturers often conduct these tests to comply with regulations and protect consumers. In the world of glass production, continuous advances in technology and materials aim to reduce or eliminate the use of heavy metals, thereby increasing product safety and consumer health protection.