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# A REVIEW: PERFORM QUALITY CONTROL TEST FOR CONTAINER CLOSURES AND SECONDARY PACKING MATERIAL USED IN COSMETICS

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**ABSTRACT:**
*Packaging affects the Quality and safety of the medicine. Packaging provides adequate protection to minimize the content of the ingredients and must not physically or chemically interfere with the information in a way that would render them better than the limit given in the individual monograph and create a risk of toxicity. The most commonly used packaging materials are containers, lids, boxes or boxes and boxes. Containers can be made of glass, plastic, metal or paper. Materials used for sealing may include cork, glass, plastic, metal or rubber.*
*Specifications and requirements for quality control depend on the type of drug used. Testing commonly used containers for glass includes broken glass, full container test, chemical resistance, water resistance test, etc. There are many ways like. Same test. The recorded materials are transparency test, permeability breaking test, self-capacity test, extraction test etc. Requirements for product testing are based on specific guidelines from regulatory agencies such as WHO GMP, USFD and ICH guidelines. Cosmeins mean "preparation" and "decoration". Kosmos means order. It also means "to produce beautiful, especially difficult or beautiful"; it also means "to complement and beautify a flaw, especially a facial flaw." There are many types of packaging used for various cosmetic products. Common materials include glass, metal, plastic, etc. is available. Today, you can easily find many Beauty products are available, from complimentary cosmetics like creams and body care products to jars of lotions, creams, lip balm powders and more.*

**Keyword:** *Material strength, Physical characteristics, Quality assurance, Testing methods.*

## INTRODUCTION

Packaging is the process of packaging medicines appropriately to preserve their therapeutic properties from packaging to consumption. Packaging can be It is defined as the art and science of transporting, storing, displaying and preparing goods for use. medicine package is a way to provide protection, display, identification, information and convenience to promote adherence to treatment. Cosmetics means articles that are applied, poured, sprinkled, sprayed, penetrated is applied to a portion of the human body for the purpose of washing, protecting, embellishing, improving beauty and changing look.

**Categorization of cosmetics: -**

Cosmetic are divided into the following two primary categories

**According to the purpose**

- It's to the completed work
- Because the body is strong.

**1. By usage:**

i. It is used on the skin as creams, powders, lotions, deodorants, antiperspirants.

ii. Nail polish, nail polish remover, manicure preparation for quotes like.

iii. Use on teeth and in the oral cavity, e.g., Toothpaste and mouthwash.

iv. Use on eyes like eye cream, eyelashes and eyeliner. to. For hair such as shampoo, hair dye, hair restoration or hair gel.[1]

**2. Based on the work:**

i. Therapeutic or curative purposes, such as hair gel and antiperspirants preparation.

ii. Protective purposes, such as using face powders

iii. Ornamental purposes, such as eyelashes, lipsticks, and nail polishes [2]

**3. Considering their physical characteristics:**

i. Aerosols, which such as after-shave lotions and hair fragrances

ii. Cakes, such as rough or made-up compacts Lotions such as creams, cold creams, cleansers

Packaging plays an important role in cosmetics production. Besides quality, the overall appearance of cosmetic products is also an important factor in determining its business. Cosmetic packaging should be simple to write. Where necessary, printing of product names, brands and other necessary information such as ingredients, instructions for use and warnings should be allowed. The design of the container should Permit the product to exit but prevent it from entering. This is to avoid infection as an illustration, hoses. In addition to ease of use, another important factor in beautiful packaging is theft. Almost every cosmetic box has a seal or part that breaks when first opened. This guarantees that the item is completely new and has not been tampered with. Four important factors in choosing a beauty box are the type of packaging, integration, usefulness, and security of the product. Advantages and drawbacks associated with some skins.[16]

**Properties of cosmetics:**

**1. Physical properties:**

- Equipment must be free of contaminants such as debris, liquids, oils, vapours or bacteria.
- If the operation involves sterilization, the container must be heat resistant. - The surface must be clean, which is often difficult with plastic, for example.
- Packaging needs to be appropriate so that if the rubber gets damaged it will cause problems.
- Equipment should be protected from light where necessary, for example it should have UV absorbers.
- The box should not absorb product from the product; for example, cardboard absorbs the moisture in the cream [3]

**2. Chemical Properties:**

- Containers should be closed and should not be mixed with each other, alone or on top of the product. This will happen with some combination of different products.

- In the event that alkaline products are placed in aluminium containers the product should not exist stored in a box or closed.
- Biocide loss in glass, plasticizer loss in plastic, etc. Drugs should not be removed from products due to situations such as.[4]

**3. Biological products:**

- If this danger can be avoided, the container's material needs to be insect-resistant.
- Packaging should not encourage Mold growth. Cellulosic materials pose the greatest risk and if the use of these materials cannot be avoided, durability can be reduced by impregnation.

**Packing materials:**

**1. Glass packaging:**

Among the first materials used for packaging is glass. and have been used for decades. Glass is impermeable and nonporous, does not deteriorate and is chemically inert. This means that its purpose is to maintain the oxygen and moisture content, thus making the content good. Glass is a common material used in cosmetic packaging for this reason. Glass may be recycled without losing any of its quality because it is a robust product. Depending on the container's capacity, cheap soda -lime glass can discharge sodium ions into the aqueous medium and raise pH.[6]

**Types of glass:**

i) Glass borosilicate
ii) Glasses with treated soda lime
iii) Regular soda lime
iv) Glasses with general purpose

**1. Type soda lime Borosilicate glass:**

High Strength Glass

Most of the alkali and earth metal cations are replaced by boron and/or lead and zinc.

It has more inertia (does not have or has enough cation) than a soda-juice glass.

It is used in the processing of all kinds of solvents as well as strong acids and bases.

When producing Type I glass, the addition of approximately 6% boron reduces leakage.

**2. Type II: (Glass with Soda and Lime)**

At the time the glass container is kept for a number of months in a particularly humid place or temperature change, moisture on the surface may condensate (condensate) causing the salt to dissolve from the cup. This is called "blooming" or "weathering" and causes small crystals to appear atop the

Type II containers are made of processed or commercial soda-lime glass. Edit to remove roots.

The process of dealkalization is called "sulphur treatment" and prevents the "wearing out" of empty bottles.

Some manufacturers expose glass to areas where water vapor and acidic gases are present. This causes an interaction between the gas and the base, making it resistant to water attack.

The alkali extracted from the glass appeared on the surface of the sulphate layer that was removed when the glass was removed. Containers are cleaned before filling.

Therefore, the sulphur process neutralizes the alkali oxides on the surface, making the glass more durable.[7]

**3.Type III: - (Lime Glass for Regular Soda)**

Containers are untreated and made of commercial soda-lime glass of average or above on average strength.

**Sort iv:**

Containers made of soft glass are used for parenteral products, such as oral or topical products.

**Packaging test procedures:**

Test procedures can split up into two groups. depending on When the test is used to individual packages or a entire package.

**1. Test materials: -**

Tests used for packaging could be:

**A. Chemistry:**

PH of chloride also sulfate materials in paper or cardboard, alkalinity of glass, compatibility testing along with drugs and pharmaceuticals analysed.
It can complete the measurement process of wrinkles, folds and other effects.
Environmental components can be examined for water absorbance, watervapor, oil, gas, odor, and other permeability using methods. and optical transmission properties.[22]
**Test Suite:**

**Mechanical: -** Mechanical testing is used only for outer packaging to avoid handling hazards. These in clued the use of standardized testing methos to compare the effectiveness of if different protective equipment in preventing g damage from the elements.

**Environment: -** Packaging is in environmentally friendly conditions with some tests carried out at appropriate times. Such a method can be used to measure the water vapor transmission rate of the cap.

Damages caused by packages:

Dangers posed by machinery - impact, compression, piercing, vibration and so on.

Dangers to the environment - heat, tension, humidity, oil, lag That, pollution, and so on Many tests are performed to ensure that the final product meets its specifications. Evaluation of the environment or the materials and equipment used in the process can also be considered as part of the control process.[10]

**Technological tools used to manage packaging**

Spectroscopy.

Chromatographic technique.

Thermodynamic Analysis Technology.

Analysis of Gas Transport.

Visual inspection.

The science, art, and technology of packaging involves enclosing or safeguarding things for their distribution, storage, sale, and utilization.[11]

**Fig.1: Packing Material**

**Types of Packaging: -**

Initial packaging.

Secondary packaging.

Tertiary packaging.

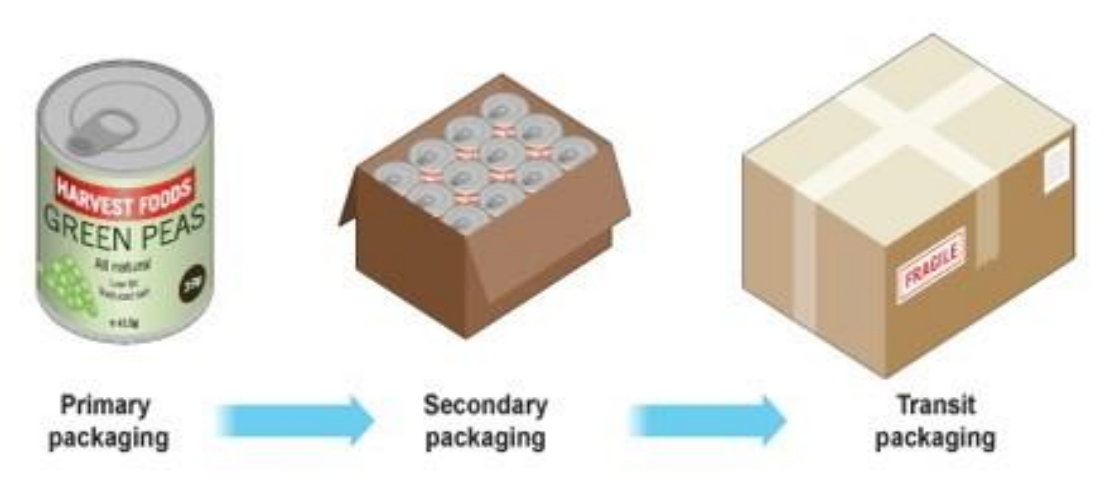


**Fig.2: Packing Material**

**Containers:**

The storage medium (glass and plastic) During which the item is positioned, sealed and in close proximity to the medication.

**Fig.3: Packing Material**

**Examinations on containers:**

**Quality Control Tests for Glass Containers**

Glass powder test
Test for water attack
Test for hydrolytic resistance
Test for arsenic
Test for leaks

**Plastic Containers Quality Control Test**

Permeability of water vapor
Test for light transparency
Water extract or clarity

**Type Glasses:**

Glass that is neutral or borosilicate
Glasses of treated Sodo limes
Glass of soda
Lime General purpose soda lime glass

**Glass container quality control test:**

**The powdered the glass evaluation:**

Used to calculate the alkali content leaching from frit, which usually occurs at low temperatures.

When the glass is powdered the alkali leaching is increased and can be used to titrate 0.02 N sulfuric acid with the help of methyl red indicator.[15]

**Step 1: Glass specimen preparation:**

The sample container is rinsed with clean water and dried.
Mix the contents into fine powder in a mortar and add No. Pass through 1. sieve Between the ages of 20 and 50.

**Step 2: Cleaning the sample:**

A 10-gram sample is dried after being cleaned with acetone.
The dried sample is combined with 50 cc of distilled water, autoclaved for 30 minutes at 121 °C, cooled, and then decanted.
Using methyl red as an indicator, 0.02 N H2 SO4 is used to titrate the decanted liquid.

**Hydrolytic resistance of glass containers**:

Every container is filled to capacity after being rinsed with C02-free water at least three times.
For ten minutes, Bottles and vials are covered and heated to 100°C for autoclaving. In 20 minutes, the temperature rises from 100°C to 121°C.
A temperature is held between 121°C and 122°C for 60 minutes. After the containers are chilled, the liquids are mixed also their volumes are determined.
It is titrated using methyl red as an indicator and 0.01M HC1.[18]

**Test for arsenic:**

Glass jars meant for the purpose of this test, aqueous parenteral. For five minutes, the interior and exterior of the container are cleaned with fresh, distilled water.
After that, the same procedures as in the previously mentioned hydrolytic test are followed to get the ultimate combined resolution.
Small out of ten millilitres of the final total volume, plus ten millilitres of HNO3, and dry in an oven at 130 degrees Celsius.
After adding 10 ml of hydrogen molybdate, the mixture refluxes for 25 minutes.
After cooling, the absorbance at 840 nm is determined.
The test solution's absorbance ought to be lower than the absorbance measured with one millilitres that the standard arsenic solution (10 ppm)[19]

**Quality control examine for Plastic Control:**

**Leakage test: -**

Ten water-filled containers with pre-planned closures are used.
For a full day, they are stored reversed at room temperature.
If There aren't any indications of seepage from any of the containers, the test is considered passed.

**Test for collapsibility:**

This examination is appropriate for containers with their contents must be squeezed out.
When used, a container that collapses inwards will generate at least ninety percent of its typical contents at room temperature and the required flow rate.

**Aqueous extract's clarity:**

Parts that are not laminated, labelled, or marked are randomly selected from a suitable container.
None of the strips that make up these sections have a surface area greater than 20 cm2.
The strips are shaken via two or more different amounts of purified water for approximately thirty seconds to remove any extraneous matter.

The sample that has been processed is placed inside the flask with chromic acid cleaning, and then rinsed with distilled water.
The flask is filled with 250 ml of distilled water, covered, and autoclaved for 30 minutes at 121 °C.
Once cooled, the extract is inspected. It ought to be turbidity-free and colourless.[20]

**Quality control tests for closures:**

**Creating the sample:**
For five minutes the closures have been immersed in anionic surface-active agents at 0.2 per cent w/v.200 ml of water is added after five distilled water rinses.
Autoclaved for 20–30 minutes at 119°C to 123°C while covered with aluminium foil.
After cooling, the solution (Solution A) is extracted from the closures.
Residue on evaporation.
On a water bath, 50ml of Solution A is evaporated until dry, then dried at 105°C.
The residue has a maximum weight of 4 mg.

**Sterilization test:**
The closures used in the sample solution preparation process must not soften or become tacky, nor should they change visually.
pH of aqueous extract.
0.1 ml of bromothymol blue solution is added to 20 ml of solution A.
It takes NMT 0.3 ml of 0.8 ml about 0.01M hydrogen chloride or 0.01 M sodium hydroxide will make the solution blue as well yellow.

**Self-stability test: -**
Ten punctures using a hypodermic needle.
Submerged in a 0.1% methylene blue solution and compressed to roughly 27 Kpa.
Put back under ATM pressure and forced to stand for thirty minutes.
There shouldn't be any traces of coloured solution.

**Box quality the control evaluations:**

**Contraction:**
Formerly used to estimate a level that protection that a bundle offers its contents in order to determine how strong it is.
Products that lack inherent strength in any one plane can benefit from this.

**Carton opening force:**
Products that lack inherent strength in any one plane can benefit from this.
The cartooning machine may have issues in the event that the carton collapses or does not open.

**Quality Control Tests for Paper and Board:**

| Name of the test | Description |
|---|---|
| **Moisture content** | Every single substance It'll be tracked at the temperature set for the test. |
| **Content of moisture** | Every single substance can be calculated at the temperature being tested. |
| **Folding stamina** | Refold the test piece. and so on until there is a rupture. |
| **Air permeability** | It is crucial to use thin, uncoated paper in machines with vacuum pick-up systems. |
| **Tensile strength** | The max the maximum tensile force per unit width that a piece of paper or board can bear before cracking. |
| **Tears' potency** | The median quantity of force needed to tear a single sheet of papers after the first cut. |
| **Rigidity** | Degree of resistance that a bent piece of paper or board offers. |
| **Burst resistance** | The max pressure that is equally distributed and applied at an angle to the surface on which a test piece of paper and board will stand while the test is being conducted. The diaphragm is compressed by hydraulic pressure until the test piece bursts. |

**Packing operation:**

It is important to make sure that the medicine is filled into the container correctly. All tasks should be clearly defined and the writing process should be strictly followed. Particular care should be taken not to place different items near the box unless they are physically separated. To prevent accidents and contamination, the writing process should include the following features:

Before packaging begins, heads have to be taken in order to guarantee operation areas, packaging lines are safe, printers and other equipment are clean and free of old equipment and materials. or documents.

Use the batch number or chemical control number to check the production status and view historical data among the group.

The designation and batch quantity of the finished the item ought to place on every box area and production site.

Every item, labels, tags as well as packaging materials must be examined for quantity, identification additionally compliance along with guidelines for packaging when delivered to the packaging department.

Check product packaging and labels for suitability and accuracy before starting the packaging process and record the analysis in the production data.
The packaging needs to be cleaned before filling. Care should be taken to prevent and remove contaminants like glass shards along with fragments of metal (if present).
Online checking in the item while it is being packed ought to be checking the minimum of the subsequent: · Efficiency for packaging. · Although a packaging is complete and can be counted according to the specification. Regardless of the materials and packaging used. · Whether the job is correct or not. Line management.
Products that fall into special situations (reprocessing, re-inspection) can only be returned to the system after a detailed examination by authorized personnel.[22]

**WHO Guideline for quality assurance for packing substances: -**
Every container and closure meant for usage must abide by the requirements of the Pharmacopoeia and other regulations.
Appropriate standards, specifications, standards, cleaning protocols and sterilization protocols need to be adhered to for packaging.The pharmacopoeia's standards for plastic granules must also be met, including those for physical, chemical, and biological testing..
Every container and closures ought to be washed with water before injection, per documented sterilization procedures.
Sealing, packaging and stopping should be designed to provide an airtight seal when inserted into the bottle.
It's important to make sure that the containers and lids selected for special products do not obstruct the products.
When using glass bottles, a maintenance program should be established and followed.
A container containing injection and ophthalmic preparations should be examined in diffused light against a black background to make sure there are no foreign materials in them. [21]
**Glass's containers:**
Glass bottles should have appropriate and suitable shapes and designs.
Use just glass bottles composed of glass that is USP Type I and Type II. USP Type III glass containers can be used for a sterile non-parenteral goods.

**Plastic Containers:**
Before-packaged vessels made of plastic for packaging large containers should be derived internally through ongoing activity. of automatic machines.
Molding, Procedures involving sealing and stuffing must be executed in an apparatus that meets with the guidelines.

**Elastic stoppers**:
The Indian Pharmacopoeia's criteria should be followed while employing rubber stoppers on big boxes.

## CONCLUSION:

Almost all pharmaceutical industries require packaging testing. Information wrapping has an impact on both quality and stability. and performance of pharmaceutical products. Packing cost had to be as low as is possible without affecting the standards for the output. Special tests must be passed before reaching the local market and being offered to customers.
A multidimensional approach to quality control, encompassing material science, analytical chemistry, and regulatory compliance, is paramount to ensure the safety, efficacy, and market success of cosmetic products. As the cosmetic industry continues to innovate, staying abreast of evolving testing methodologies and regulatory expectations is essential for maintaining the highest standards in packaging quality.

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