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A Comprehensive Review on Materials and Functions in Blister Packaging

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ABSTRACT

Blister packaging is mainly used in pharmaceuticals packaging applications which have a close relationship with the safety and stability of the drug. It is the primary packaging material in pharmaceuticals which have direct contact with the product inside and also with the outer secondary package. The stability of the drug depends upon the materials used in the blister packaging and their efficacy to protect the drug from physical degradation as well as the chemical changes. During the blister packaging, it has been observed that the use of substandard blister packaging materials leads to sealing problems, stability problems, and moisture barriers etc. This paper focuses on features and functions of various materials used in blister packaging keeping in view the various factors taken into consideration while selecting material for blister package.

Keywords: *Blister Packaging, Blister Materials, Pharmaceuticals Packaging.*

I. INTRODUCTION

Blister packaging is mainly made from base layer (PVC) which hold the pharmaceutical product in its cavities, it provides better protection as compared to strip packaging. The aluminum foil or paper used as a lidding material. The lidding material and a base layer of PVC sealed by applying heat and pressure for a particular dwell time known as blister sealing process.

Fig.1. Blister pack

Blister packaging is the primary packaging which is in touch with the packed dosages in pharmaceuticals applications so the packaging must be such that there is no interaction with the drug and will provide proper containment of the packed materials. Blister packaging in the pharmaceuticals applications is used for expression of the brand identity, quantity as well as intrinsic qualities and stability of the product. The physical and chemical properties of the pharmaceutical's product are mainly depending on the quality of the materials used in blister packaging.

Advantages of Blister Packaging:

- It protects the product for longer life.
- Blister packaging provides separate blister for each pill and capsule.
- Easy to use and transport.
- Very low wastage

Disadvantages of Blister Packaging:

- Uses of Aluminium take more time and cost as compared to plastic packing.
- The Patient can push through the backing foil easily which is child resistant.
- Sealing process takes too much time to get proper sealing.

Selection of Blister Packaging Materials for Pharmaceuticals Packaging Applications:
In the pharmaceutical's applications of blister packaging mainly polymers containers (PVC & PET) used for blister cavities and paper or aluminum metallic foil isused for lidding materials as well as solvent and water-based heat-seal coating is used as adhesive materials.

PolymerBlister Cavities: Polymer containers are the most widely used packing materials in pharmaceuticals blister applications due to its various advantages like unbreakable, less weight, low transport cost and could easily be molded in the desired shape.

Polyvinyl Chloride (PVC): Polyvinyl chloride has good crystal-clear surface and providesgood protection from chemical hazards. Polyvinyl chloride has low thermal stability low physical endurance as compared to PET films after but due to its low cost and good barrier properties it is the most widely used material in blister packaging applications of pharmaceutical.

Fig.2. PVC Blister Cavities

Polyethylene Terephthalate (PET): Polyethylene terephthalate has better strength and transparent surface with good thermal stability as compared to polyvinyl chloride but it requires high temperature during blister sealing process. So, it is used in such an application where high thermal and physical stability is required.

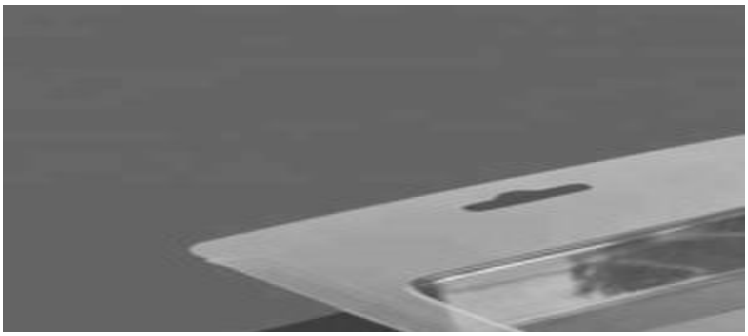

Fig.3. PET Blister Cavities

Paperboard: Paperboard is used as a backing material in blister packaging application it holds all the printed product information on its outer side and other side is attached with plastic containers. There are various types of paperboards are used in blister packaging application according to the suitability of the product and environmental conditions.
Types of paperboard used in blister packaging applications:

- White Back Paperboard (WB)
- Gray Back Paperboard (GB)

- Folding Box Board (FBB)

Aluminum: Aluminum foil is used in such application where more water and oxygen obstruction and long life is required for the product. It is used into cold forming process of blister packaging because of its different points of interest into 3-layers overlay: PVC/Aluminum/Polyamide. The PVC side is within in contact with the product. Aluminum foil has more cost as compared to polymer films.

Fig.4. Aluminum Cavities

Heat Sealing Coating: In blister packaging application generally, solvent-based coating (3GSM-5GSM) is used as an adhesive to provide bonding between the plastic containers and backing paper surface. The Solvent based coating has fast drying properties as compared to water-based coating, whether the water-based coating is used to reduce the chances of flammable and environmental hazards.

Ink: The ink used for printing of lidding substrates in blister packaging doesn't contain any pigments and vehicles in excessive amount like greases, lubricants, and hydrocarbons etc. which present generally in conventional printing inks. These properties of blister inks help to reduce chances of blocking, rubbing and tackiness problems at high temperature and pressure during heat sealing process of blister packaging. Blister inks can be printed by the use of any printing process like letterpress, offset, gravure flexography and digital etc. In blister packaging mostly, wax free ink is used for printing on lidding materials on single and both sides, blister inks have good thermal stability and can bear high pressure during the sealing process.

Features, Functions, and Selection of Blister Packaging Materials:
Selection of the blister packaging material is based on the physio-chemical characteristics of the product, the package must provide identification, protection, and information to the product.

The Function of the Blister Packaging Materials:

a) Identifications Functions:

- Anti-Counterfeiting Features:
  - Holograms
  - Optical variable devices (OVD)
  - Security inks and
  - Sequential serial numbering
  - On-Product Marking
  - Invisible Printing
  - Watermark
  - Laser Coating
  - Anti-copy design
- Date of manufacturing
- Date of expiry
- Batch number and warning if any.

b) Physical Protection Functions:

- Protection from biological hazards.
- Protection from humidity, temperature, and gases.
- Safety from light sensitivity by light amber color coating.

- Protection from static and dynamic vibration during handling and transportation.
- Adaptable to the packaging equipment.
- The Package should be child resistance.

c) Other Function:

- Package must have low cost with maximum benefit.
- Package must be approved by FDA.

II. CONCLUSION

Blister packaging plays vital role in pharmaceutical industries for protection of the product. It is packaging configuration which is capable of providing good environmental protection. It also provides some other user-friendly functions like child resistance, anti-counterfeiting and tamper resistance. In the packaging process different materials like paperboard, Plastic containers (PVC, PET etc.) may vary according to the suitability of the pharmaceuticals drug characteristics. The function and features of materials used in blister packaging used in the pharmaceuticals industry surely will help the printers and packers for choosing best materials for their selective packaging applications.

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