

Packaging of Food Products



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FUNCTIONS OF PACKAGING

Preserve

Protect

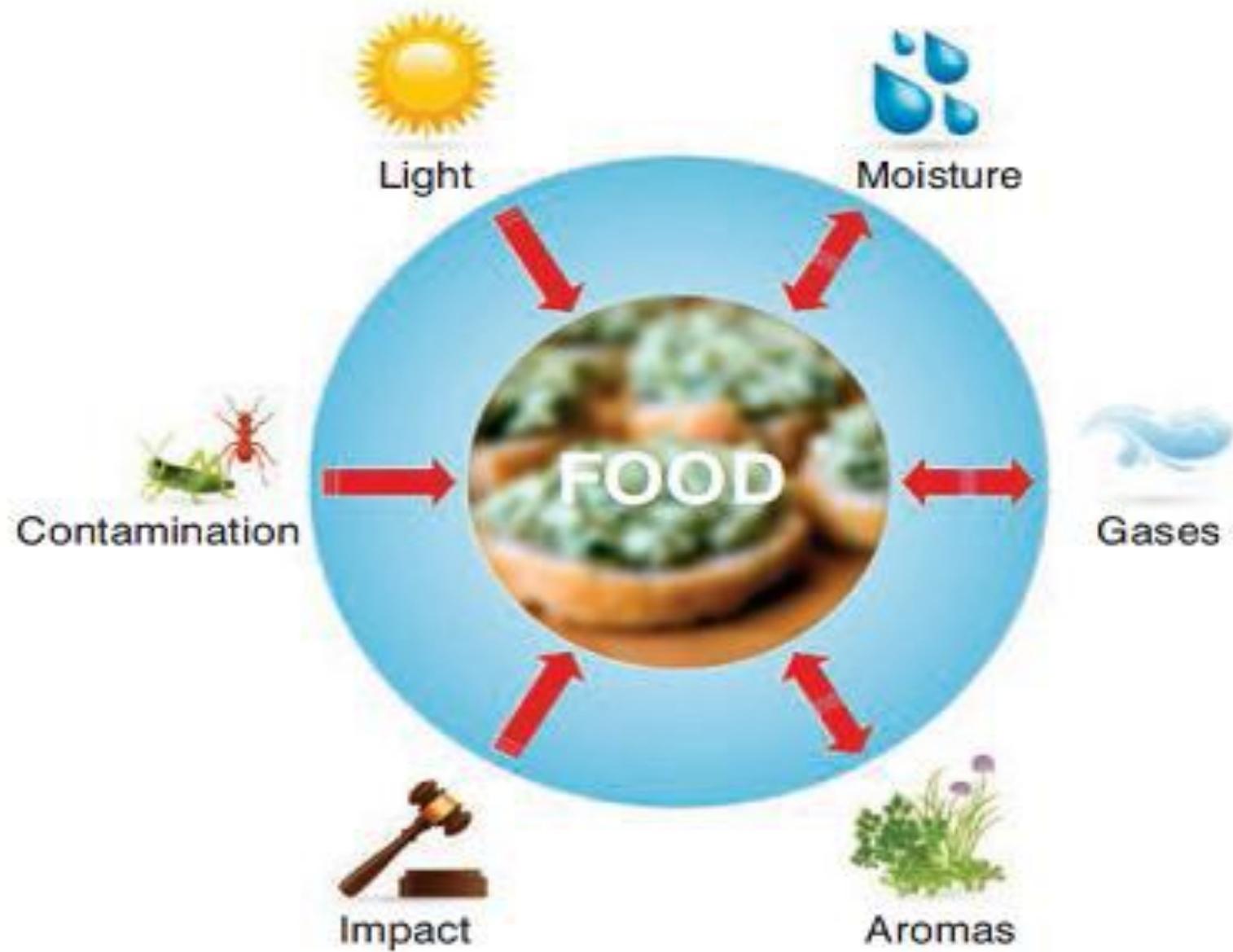
Inform

Transport

Extend

Interact





Interaction of influences on food products

Types of Packaging

Consumer Packaging

- Designed for consumer
- Is convenient & appealing
- Main emphasis is on marketing



Industrial Packaging

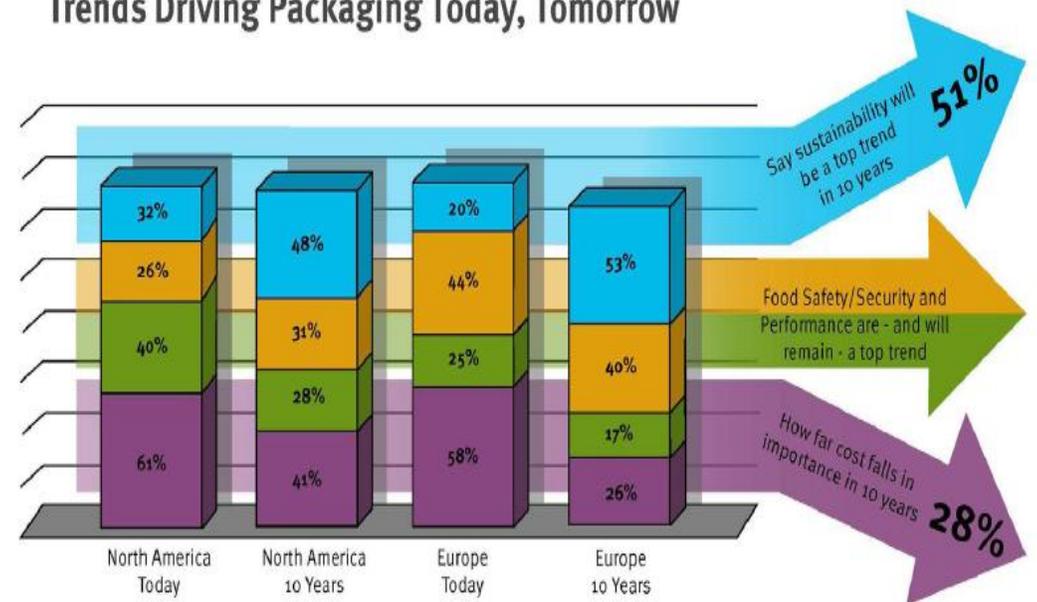
- Focuses on the handling
- Protection & display during transportation
- Main emphasis -is on logistics



PACKAGING DESIGN: 5 PILLARS



Trends Driving Packaging Today, Tomorrow



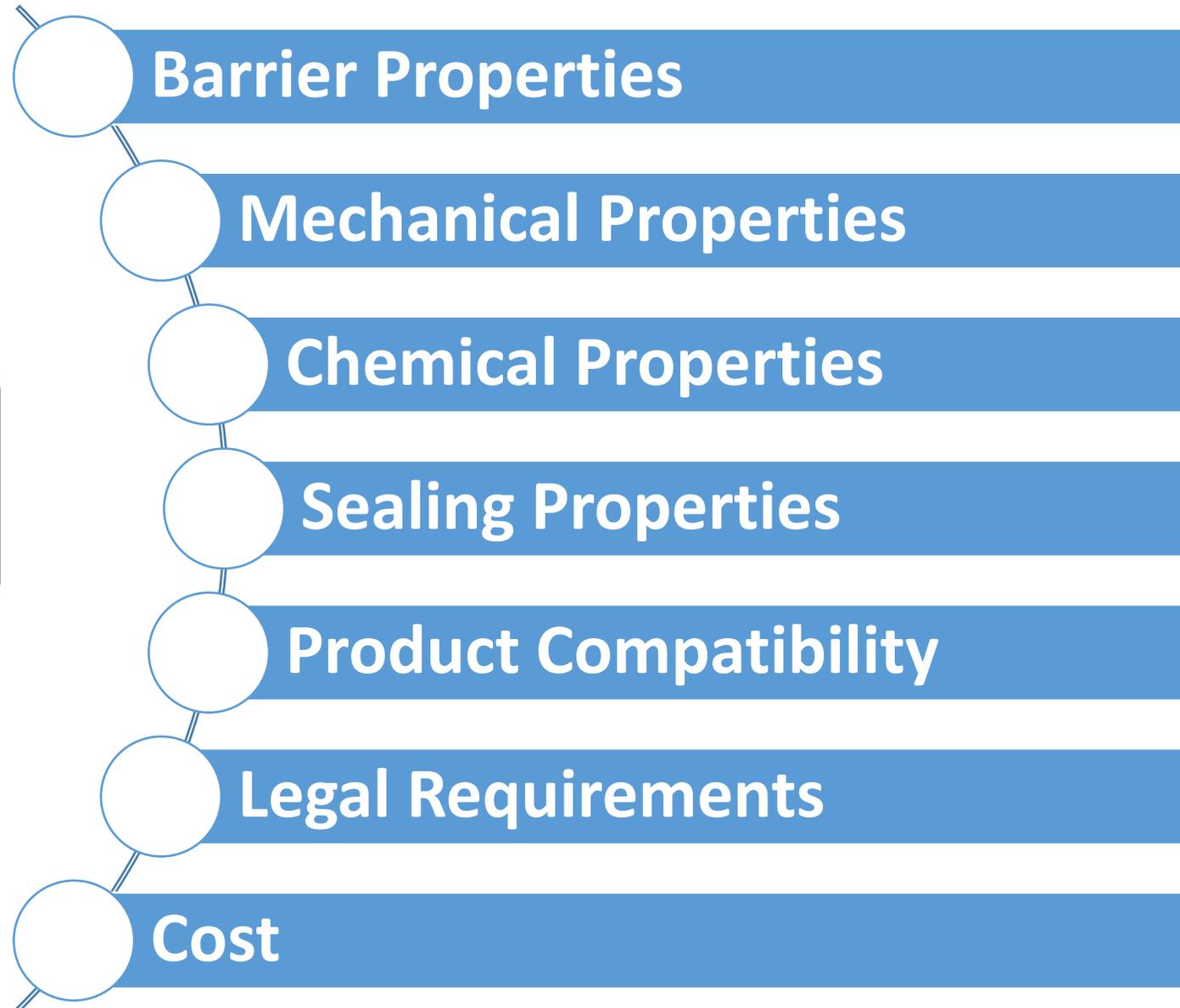
Packaging design

When designing packaging, it is important to consider the following:

- Is it easy to handle and open?
- Is it a convenient shape, so it is easy to stack?
- Which colours will be used on the packaging?
- What size of print should be used? (Can consumers read it easily?)
- Will it be economical to produce?
- What about environmental considerations?

(Will it be recyclable or does it make minimum use of natural resources?)

Properties of Packaging Materials



CHARACTERISTICS

Environmental Factor	Deteriorative Effect of Food	Protective Packaging Property
Oxygen	Lipid oxidation, Vitamin Destruction, Protein loss	Oxygen barrier
Moisture	Nutritional quality loss Organoleptic changes, Browning reactions	Moisture barrier
Light	Oxidation, Rancidity, Vitamin destruction, Protein & Amino acid changes	Light barrier
Micro-organisms	Food spoilage, nutritional/quality loss, health hazards	Hermetic containment
Mechanical Abuse (drop, compression, vibration, handling)	Organoleptic changes, spoilage and other quality changes	Sealing properties
Odorous substances & toxic chemicals	Off-flavor formation, taste Deterioration, chemical changes	Barrier properties, chemical substance
Tampering	Product loss, quality changes	Tamperproof, tamper evidence, tamper resistance
Consumer handling, abuse	Product loss, quality changes nutritional changes	Mechanical properties

FOOD PRESERVATION TECHNIQUES

METHODS	TYPE OF PACKAGING MATERIAL
Cool storage and cold storage Cool storage- 5-12°C Cold storage- 0-5°C Deep freeze – 15°C flow	Flexible pouches, bags & sacks treated cartons, boxes triplet containers etc.
Heat preservations Balanching-100°C Pasterisation-60-75°C Sterlisation-110-130 ° C Aseptic processing- 130°C	Hermetically sealed glass and metal container aseptic cartons and pouches.

FOOD PRESERVATION TECHNIQUES

METHODS	TYPE OF PACKAGING MATERIAL
Dehydration Concentration Evaporation Drying Increase of salt content Increase of solid content Freeze drying	Flexible, rigid and semi-rigid container.
Use of inert gas Vaccumisation Gas flushing –CO ₂ ,N ₂ alone or in combination and ozone	Rigid tinfoil flexible laminates
Chemical preservation Benzoic acid, sorbic acid sulphur dioxide etc	Rigid , flexible
Other Irradiation	

PACKAGING MATERIAL SELECTION

- Production Methods
- Display Requirements
- Economic Consideration
- Marketing Needs
- Product Characteristics
- Properties of Packaging Material

Packaging Materials

Cans

Glass Containers

Rigid Plastic Containers

Flexible Plastic Packaging

Paper & Board

Aluminium Foil & Laminates

Styrofoam

Cans

- **Cheap** & widely used
- Provides **good protection** of the contents
- **Easy to handle** during manufacture (filling stacking & packing)
- **Stack easily** on supermarket shelves
- Store for **long periods** of time
- Cans containing acidic ingredients are coated with a **plastic lacquer** to prevent a reaction with the metal
- Used for solid & semi-solid foods.



Glass Containers

Characteristics:

- Chemically inert - wont react with its contents
- Non porous, odourless & hygienic
- Contents can be seen as glass is transparent
- Great strength
- Easy open & re-sealable
- Variety of shapes & sizes
- Long-term storage & extended shelf life



Sustainable - can be recycled or re-used

Paper & Cardboard

Paper:

- Used for a wide variety of products
- Versatile & cost effective
- Variety of shapes, textures & thickness' available
- Greaseproof paper can be used when packaging products such as confectionary & butter.
- They act as a barrier to odors & moisture



Paper & Cardboard

Paperboard (thicker paper-based packaging)

Can be **laminated** with other materials to create strength & moisture resistance e.g. Tetra packs

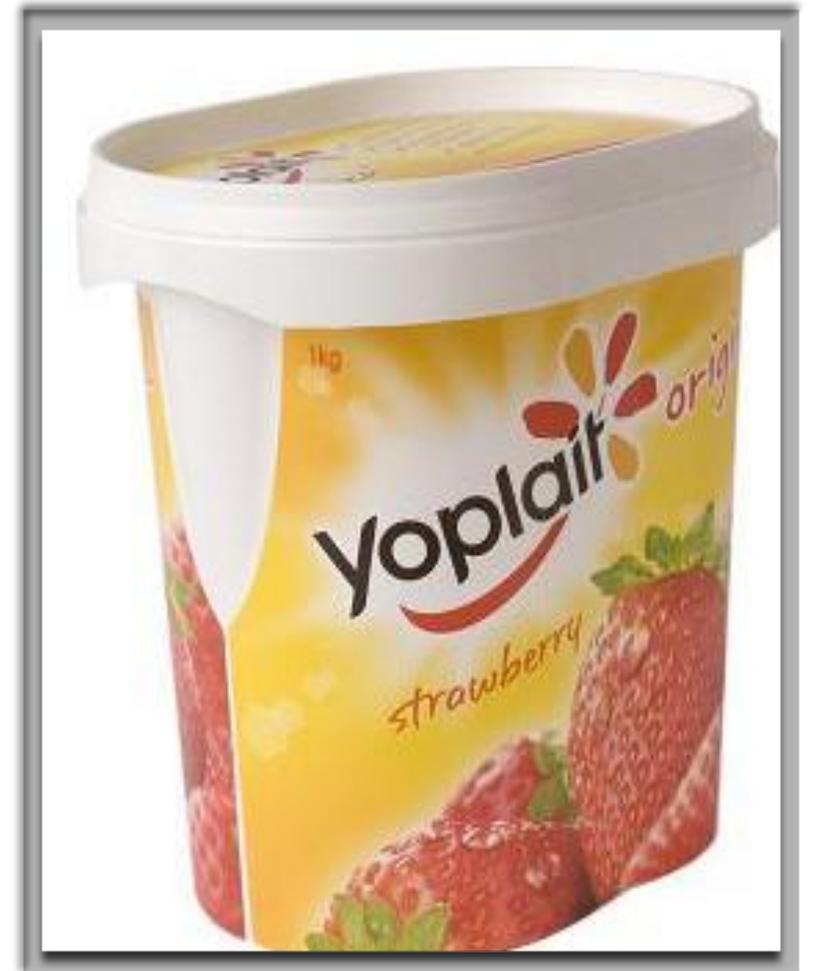
Pulped Fibreboard

Offers protection for products such as eggs because of the air-space between the particles



Rigid Plastic Packaging

- **Lightweight & strong**
- **High resistance to breakage**
- **Available in a wide variety of colours, shapes, sizes & textures**
- **Can add to the sale appeal of the product**
- **Cheap and easy to produce compared to other packaging materials**



Rigid Plastic Packaging

Types of plastic used:

Polyethylene terephthalate (PET) - Used clear as colouring has an impact on the strength. E.g. soft drink, water & oil

High density polyethylene (HDPE) - Stronger when colour is added. Used for products with a shorter shelf life E.g. milk

Polystyrene (PS) - Aerated texture allows package to protect the product from physical damage. Also provide thermal retention E.g. trays & cups

Polypropylene (PP) - High melting point, useful for hot fill products such as soups & fruits in syrup. Can be moulded easily E.g. yoghurt & ice cream

Flexible Plastic Packaging

Any plastic that is formed into a sheet or reel with a thickness up to **0.375mm**

Plastic films & Bags:

- Polyethylene (PET) E.g. cling wrap
- High-density polyethylene (HDPE) E.g. Cereal bags
- Low-density polyethylene (LDPE) E.g. Kraft singles wrappers
- Polypropylene (PP) E.g. chip, biscuit, 2 minute noodle wrappers



Flexible Plastic Packaging

 PETE	Polyethylene Terephthalate Ethylene PETE goes into soft drink, juice, water, detergent, and cleaner bottles. Also used for cooking and peanut butter jars.	 PP	Polypropylene PP goes into caps, disks, syrup bottles, yogurt tubs, straws, and film packaging.
 HDPE	High Density Polyethylene High Density Polyethylene HDPE goes into milk and water jugs, bleach bottles, detergent bottles, shampoo bottles, plastic bags and grocery sacks, motor oil bottles, household cleaners, and butter tubs.	 PS	Polystyrene PS goes into meat trays, egg cartons, plates, cutlery, carry-out containers, and clear trays.
 PVC	Polyvinyl Chloride PVC goes into window cleaner, cooking oils, and detergent bottles. Also used for peanut butter jars and water jugs.	 OTHER	Other Includes resins not mentioned above or combinations of plastics.
 LDPE	Low Density Polyethylene LDPE goes into plastic bags and grocery sacks, dry cleaning bags, flexible film packaging, and some bottles.		

Aluminum Foils

- Light weight
- Flexible
- Strong
- Able to withstand moderate heat

Examples:

Tubes - condensed milk

Trays - frozen foods

Product seals - sour cream, butter & yoghurt

Wrappers - Cadbury chocolate block



Laminations

Aluminium foil joined with other materials such as plastic and paper to create a stronger packaging material.

Example:

Muesli bar wrapper (paper, foil & plastic)

Tetra Packs:

Multi-layered laminations known as composite packages

Each layer provides a different purpose

Metallising:

Plastic coated in a fine layer of metal. E.g. Twisties chip packets



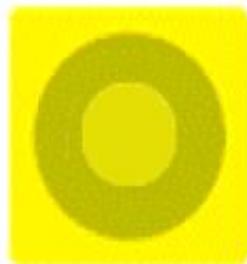
Smart Packaging

Packaging system that is capable of carrying out intelligent functions:

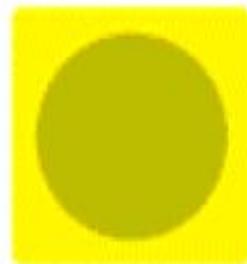
- 1) **Extend**: Prolong the shelf life of food products
- 2) **Interact**: Give consumers more product quality information



Fresh

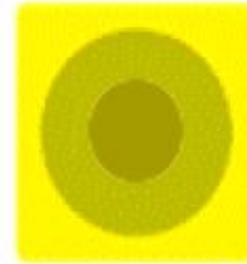


Fresh



Still Fresh

Consume Immediately



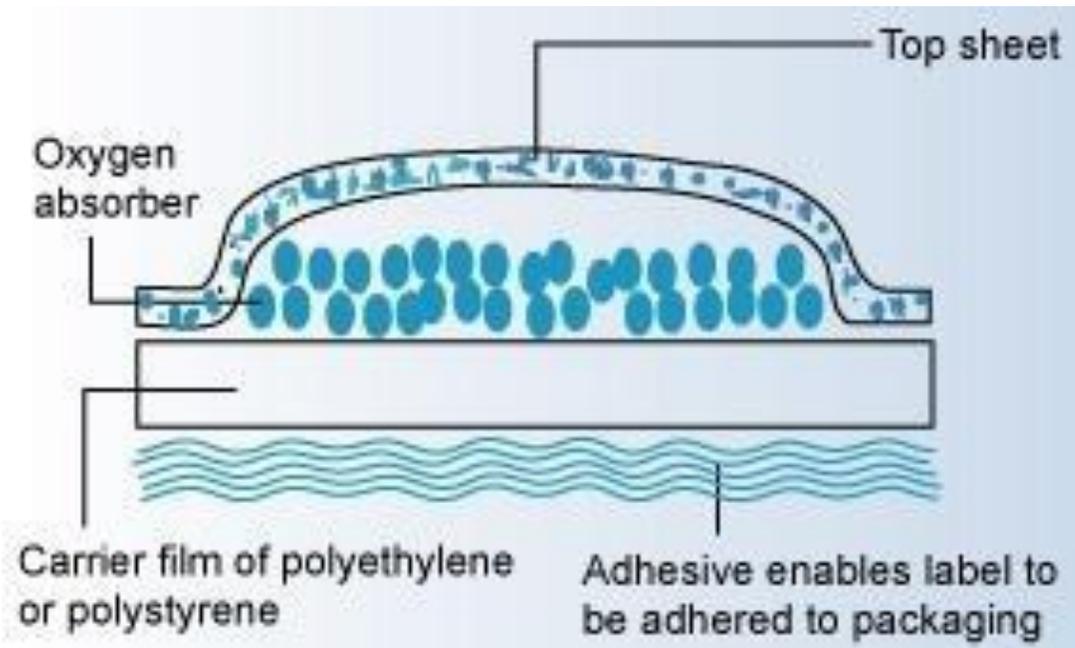
Freshness No

Longer Guaranteed



Shelf-life Extension

Active Packaging: Packaging that changes the condition of the packed food to extend the shelf-life or/and to improve safety or sensory properties, while maintaining the quality of the food



Commonly-used Types of Active Packaging

Modified atmosphere packaging (MAP) - first developed in the 1970s, MAP substitutes the air inside a package with a correct gas mix for optimum quality and shelf life

Gas Absorbers (sachets/pads/film) - capture residual gases such as O₂ and ethylene from inside the package

Gas Generators (sachets/pads/film) - ethanol and CO₂ emitters can be used as active features in order to address the weak points in the shelf life of packed goods

Antimicrobial compounds: Spices & essential oils, organic acids, organic & inorganic salts, nano-compounds, enzymes, bacteriocins

Packages using OnVu™ Smart Labels



**Many people decide to buy a product
based on how it is packaged.**

Thanks

