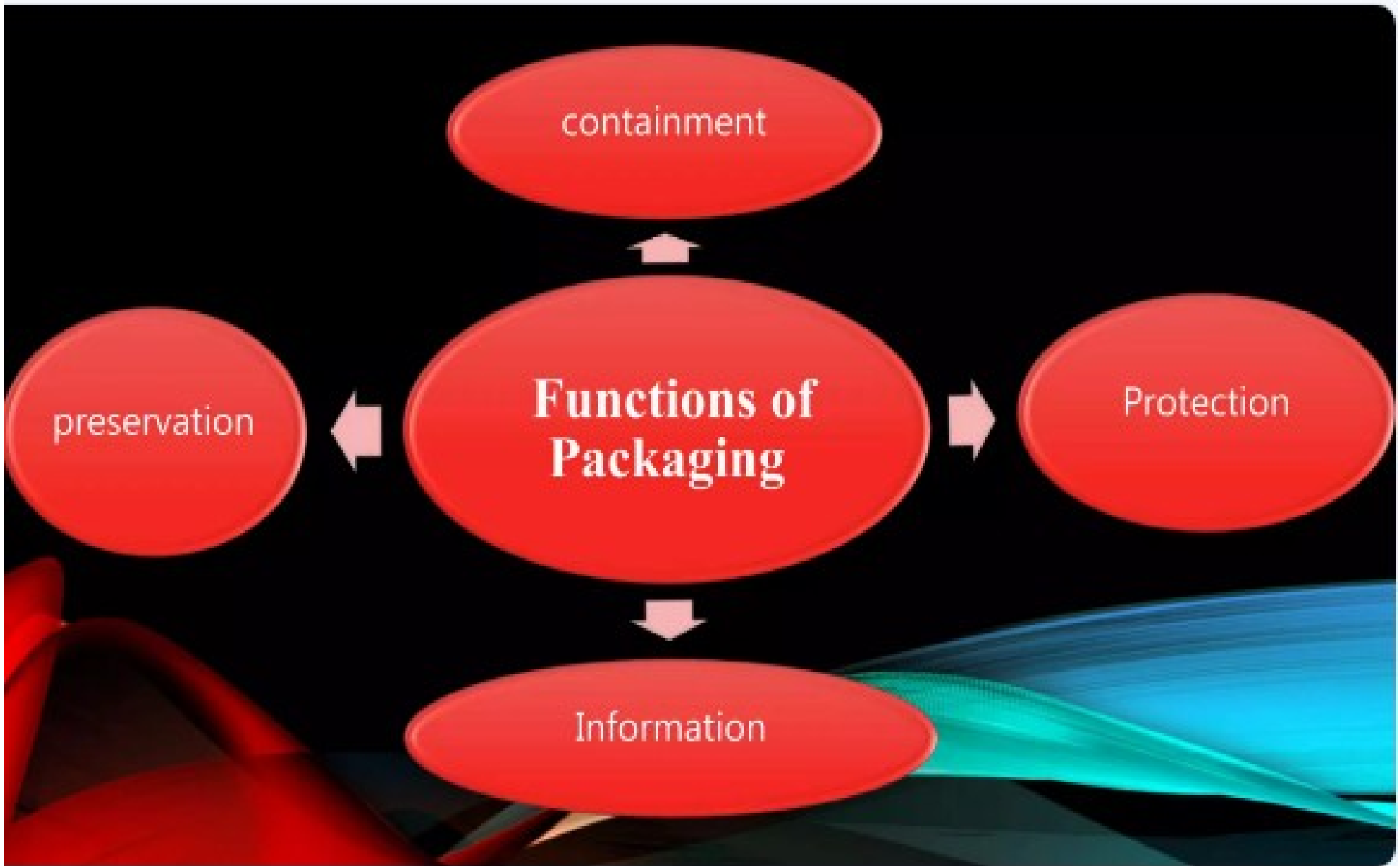


UNIT 4 - FOOD PACKAGING SYSTEM





Packing definition

- packaging as the enclosure of products in a wrapped pouch, bag, box, cup, tray, can, tube, bottle or other container form to perform
- containment,
- protection,
- preservation,
- communication,
- If the device or container performs one or more of these functions, it is considered a package.

OBJECTIVES

- to protect food products from the outside environment
- Protect from damage by abrasion,
- to contain the food,
- to provide consumers with information
- (ingredients and nutrition, quantity, price, brand name, food type and the expiry date of the product)
- Packaging is an important tool for advertisement.
- Brand awareness and customer attraction
- (Customers often make their purchase decisions based on the appearance of the product, and the logo, colors, and style of food packaging)

FUNCTION of Packaging

Packaging materials have the four basic functions (**Primary function**) of providing

- protection,
- Communication,
- Convenience
- Containment

Secondary functions

- Traceability
- tamper indication

Primary functions

1. Protection

to protect food against spoilage or deterioration due to physical damage, chemical changes or biological damage.



2. Communication

- provide consumers with information
- about ingredients and nutrition, quantity, price, brand name, food type and the expiry date of the product
- Identification of manufacturer's brand, quantity, quality and type of product.



- **3. Convenience**

Food containers can be designed to have features that make the handling, consumption, and preservation of food items easier for customers



- **4. Containment**

Hold the contents and keep them secure until they are used.



Secondary functions

Traceability:

- Ability to track any food through all stages of production, processing and distribution.

Tamper indication:

- Food tampering is the intentional contamination of a food product, with intent to cause harm to the consumer or to a private company

CHARACTERISTICS OF PACKAGING MATERIAL:



The material selected must have the following characteristics:

- Must meet tamper-resistance requirements
- Must be FDA approved
- Must be non-toxic
- Must not impart odor/taste to the product
- Must not reactive with the product
- They must protect the preparation from environmental conditions

Types of Food Packaging Materials



Cardboard



Plastic



Carton



Glass



Metal



Food packaging materials:

Two broad categories:

1. Rigid packaging materials
2. Flexible packaging materials

Rigid packaging materials:

- Metal cans:

Primarily for heat sterilized food products.

- Made of tin plate, aluminium or tin free steel.

2.GLASS CONTAINERS

Advantages:

- Chemically inert in nature.
- Excellent product visibility.
- Excellent barrier to solids, liquids and gases.
- Molded into various shapes and sizes.
- Withstand sterilization temperature.
- Refillable

Disadvantages:

- Fragile.
- Heavy weight.

3.RIGID PLASTIC PACKAGES:

- **Advantages :**
- Low cost
- Ease of fabrication

4. WOODEN BOXES AND CRATES

5.FIBRE BOARD AND CARD BOARD BOXES

Used to make shipping cases exclusively in bulk packaging.

Advantages:

- Versatility
- Light weight
- Disposability
- Low cost

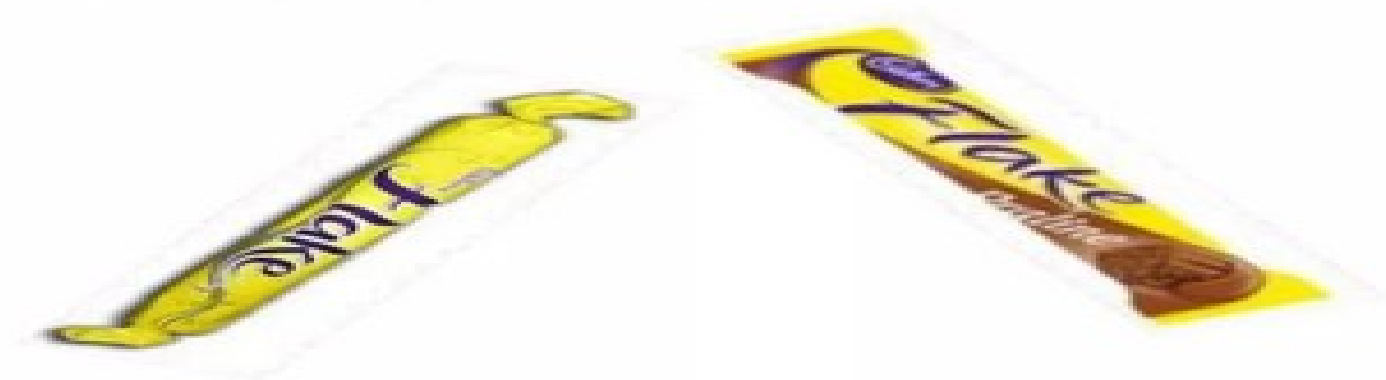
FLEXIBLE PACKAGING MATERIALS

- Aluminum foil
- Lightweight
- effective barrier to the effects of air, temperature, moisture and chemical attack
- Aluminium foil is used for aseptic cartons, pouches, wrappings
- Plastics

Types of Packaging

1. Primary packaging

- The material that first envelops the product and holds it. This usually is the smallest unit of distribution or use and is the package which is in direct contact with the contents.



Types of Packaging

2. Secondary packaging

- ❑ Secondary packaging is outside the primary packaging, perhaps used to group primary packages together.



Secondary packaging is intended to protect not only the product, but also the primary packaging, which often is the packaging most visible to the consumer in retail displays.

Types of Packaging

3. Tertiary packaging

- ❑ Tertiary packaging is used for bulk handling , warehouse storage and transport shipping. The most common form is a palletized unit load that packs tightly into containers.





Primary
package



Secondary
package



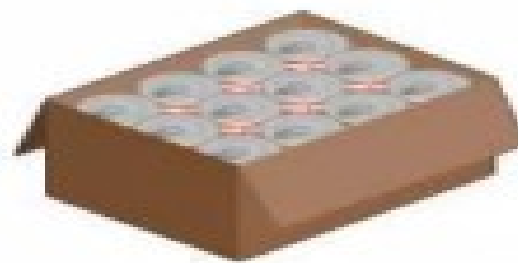
Tertiary
package

ON THE BASIS OF LEVEL

- ▶ Primary Packaging.
- ▶ Secondary Packaging
- ▶ Tertiary or transit Packaging



Primary
packaging



Secondary
packaging



Transit
packaging

1- primary packaging

Primary packaging surrounds the product and features labelling.



2- secondary packaging

ease of manual movement of products.



3- transit packaging

wrapping used to bundle the boxes or crates for transport and distribution.



Transit packaged products are placed in shipping containers for long-distance transportation and distribution



Active packaging

- *Active packaging refers to the incorporation of certain additives into packaging film or within packaging containers with the aim of maintaining and extending product shelf life.*
- modification of the environment inside the package by removing undesired gases .
- Oxygen scavenging
- Most moulds require oxygen to grow
- mould growth which limits the shelf life of packaged baked goods.
- Removal of oxygen can also delay oxidation
- iron powder, ascorbic acid, enzymes (such as **glucose oxidase and ethanol oxidase**), immobilized yeast on a solid substrate - These materials are normally contained in a sachet

Anti microbial packaging

- Food packages can be made AM active by incorporation
- **Antimicrobials** In this type of packaging, the packaging surface is polished with some materials like silver ions, chitin, chlorine dioxide, ethyl alcohol etc. which retards their growth.
- Antimicrobials reduce the growth rate of microbes and acts against their growth. •

INTELLIGENT PACKAGING

- intelligent packaging is ‘packaging which senses and informs to the customer about the status of the product
- Protection against theft and tampering
- INTELLIGENT TAMPER-PROOF PACKAGING
- Optically variable films or gas sensing dyes, involving irreversible color changes.
- Piezoelectric polymeric materials might be incorporated into package construction so that the package changes colour at a certain stress threshold

Smart packaging

- This food packaging could tell consumers whether and when it's good or bad to eat.
- Indicate the quality of the product by changing color.
- Types
 1. **A time-temperature indicator (TTI)**- A device(super sensor) is attached to measure and display temperature.
 2. **Freshness indicators** - They signal directly product quality of the packed food with the help of devices like "electronic tongue"

Water soluble packaging

- It dissolves when comes in contact with hot water.
- Also called vanishing packaging
- Reduces transport cost by shipping dry powders initially and then making final product when reached at destination.
- Easy to use.
- Reduces pollution
- Unique in the market place
- Mainly made up of PVA
(poly vinyl alcohol)





EDIBLE PACKAGING



***BY:
HIMANSHI
M***



Edible Packaging

- **The** food is generally packaged in edible material layers of other edible products.
- This step is beneficial so as to reduce the environmental pollution.
- The best thing about edible packaging is that it reduces the wastage of food

MATERIALS USED FOR EDIBLE PACKAGING

- Materials which can be used for manufacturing the edible packaging materials:
- Protein-based:
 - Gluten
 - Collagen
 - Zein
 - Soy
 - Casein
 - Whey protein
- Polysaccharide-based:
 - Cellulose
 - Alginate
 - Pectin
 - Chitosan
 - Starch
 - Dextrin

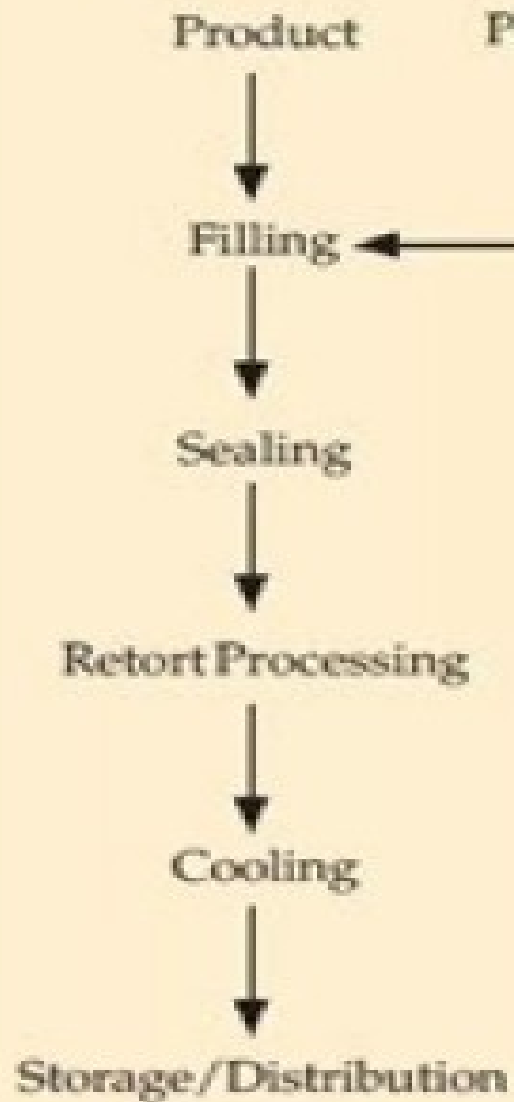
DRAWBACKS EDIBLE PACKAGING

- WRAPS ARE MORE EXPENSIVE THAN SYNTHETIC PACKAGES
- EDIBLE WRAPS WOULD NOT BE USED ALONE WHERE THERE IS UNSANITARY CONDITION DURING FOOD HANDLING
- DEVELOPMENT OF OFF FLAVOURS

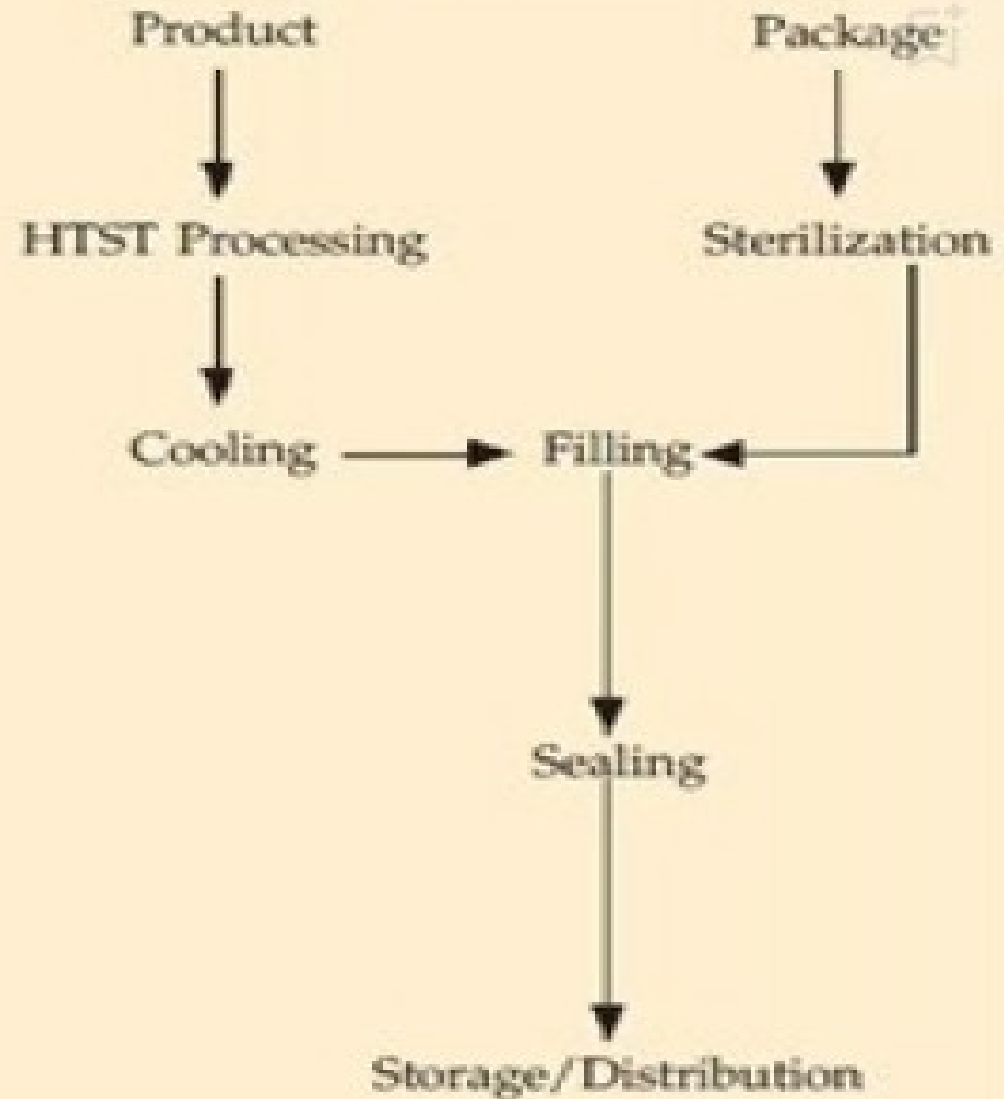
ASEPTIC PACKAGING

- **It** is defined as the filling of a commercially sterile product into a sterile container under aseptic conditions
- . • This results in a product which is shelf stable at ambient conditions.

Conventional Process Flow



Aseptic Process Flow



Advantages of Aseptic Packaging:

- ✓ **Convenience**
Aseptic packages are portable, lightweight, and shatterproof and easily transportable
- ✓ **Food Safety**
The aseptic process and carton together ensure that the liquid food or beverage inside is free from harmful bacteria and contaminants.
- ✓ **No refrigeration required**
- ✓ **Long shelf life**
- ✓ **More nutrition**
Compared with canning, products can retain more nutrients as well as natural taste, colour and texture
- ✓ **Low Packaging to product ratio**

Modified Atmosphere Packaging (MAP)

- MAP requires specialized machinery to flush out air from the packaging and replace it with a different gas or gas mixture.
- The normal composition of air is 21% oxygen, 78% nitrogen and less than 0.1% carbon dioxide.
- The modification of the atmosphere generally implies a reduction of O₂ content or an increase of the CO₂ concentration,
- extend the shelf-life of perishable foods at chill temperatures.
- **The major** gases used in MAP are N₂, and CO₂.
- • Noble gases such as argon are used commercially for food products like coffee and other snacks, however its uses are limited.
-

- Carbon dioxide (CO₂) inhibits the increase of most aerobic bacteria.
- It is the most important gas in the packaging of food under modified atmospheres. In general one can say the higher the CO₂ concentration the longer the durability of the perishable food.
- Nitrogen (N₂) is an inert gas that is used to expel air especially Oxygen out of the packaging.

VACUUM PACKAGING

- “**Vacuum packagng** is a method of packaging that removes air from the package and hermetically sealing it.”
- **Oxygen is** a highly reactive element
- many of the organic compounds in the food reacts with oxygen and cause negative changes in the color, flavor and odour.
- In the absence of oxygen the food can retain its natural properties

Nanotechnology in food packaging

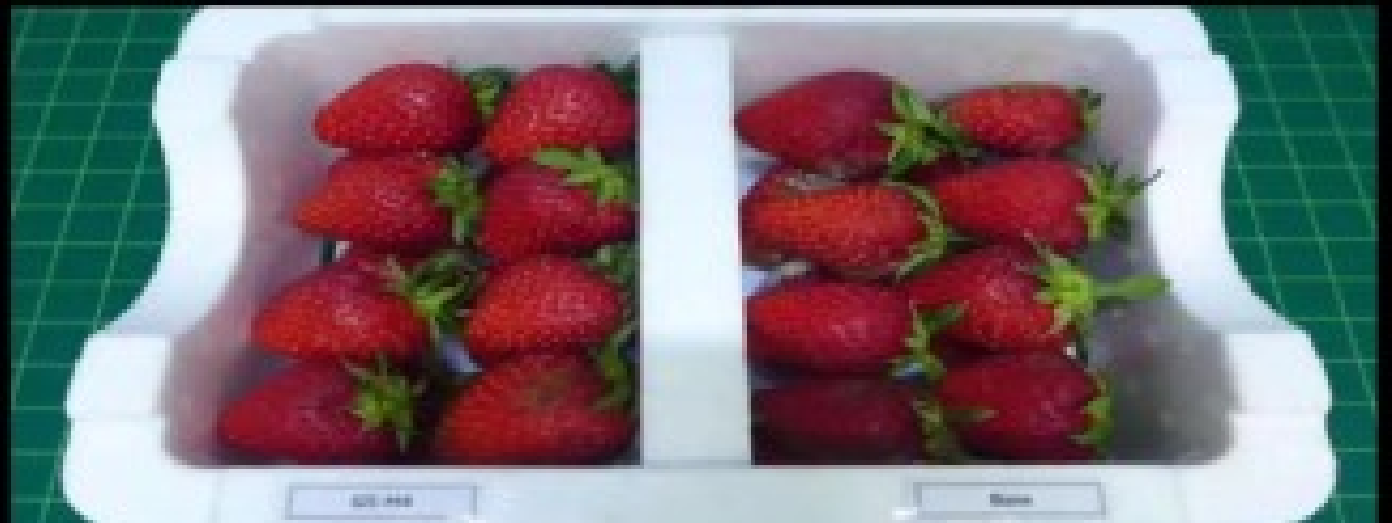
FUNCTIONAL ADDITIVES TO FOOD PACKAGING

- Silver nanoparticles
- Titanium nitride
- Nano-titanium dioxide
- Nano- zinc oxide
- Nano clay

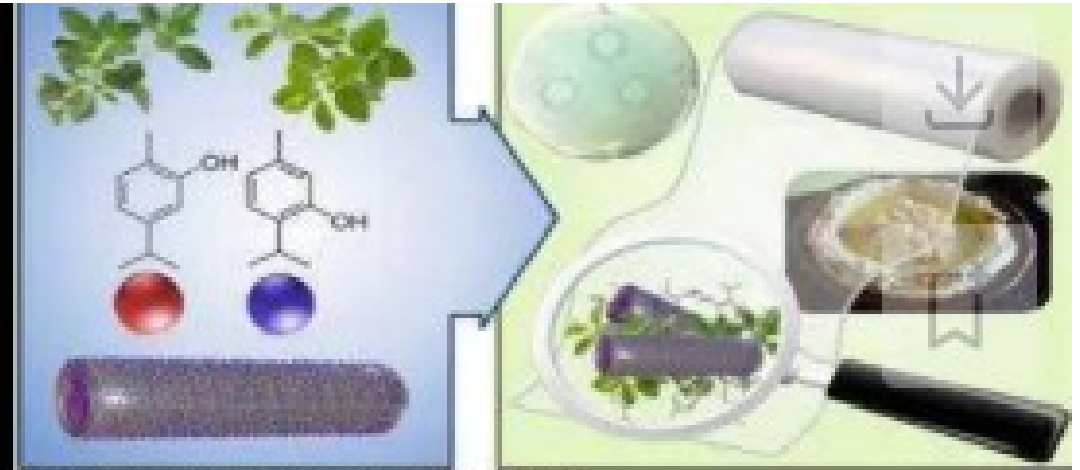


IMPROVED PACKAGING

- Nano materials are mixed into polymer matrix
- Improving barrier properties
- Used in bottles of beer, edible oils and carbonated drinks and films.
- FDA approved



1.ANTIMICROBIAL FILMS



- Helps to control growth of pathogenic and spoilage micro-organisms
- Used because of the structural integrity and barrier property
- Ag nanoparticles absorb ethylene
- TiO_2 -photocatalysis there by decreasing E.coli
- Carbon nanotubes: Antibacterial property