


TYPES OF PACKAGING MATERIALS



Syllabus Link:

Packaging, storage and distribution	
<ul style="list-style-type: none">• functions of packaging and types of materials available• current developments in packaging, including active packaging; modified atmosphere packaging; sous vide• storage conditions and distribution systems at various stages of food manufacture	<ul style="list-style-type: none">• investigate, through experimentation, the suitability of packaging materials for different food products

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Packaging

- Sometimes manufacturers use combination packages to contain their products.
- Combination packages consist of two or more separate packaging materials. For example; breakfast cereals are packaged in a plastic bag to protect against humidity and oxidation, and a paperboard box for ease of handling.
- **PRIMARY PACKAGING:** Package in which the food is sold to the consumer.
- **SECONDARY PACKAGING:** The cardboard carton which holds multiple packages and makes handling easier in the warehouse.
- **TERTIARY PACKAGING:** Used to secure multiples of secondary packaging for ease of bulk handling and distribution. For example; *shrink wrapping* of pallets.

CANS



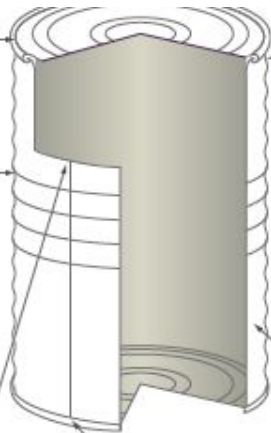
1. CANS

TWO most common types of cans;

- Steel Cans: Used for solid and semi-solid foods
- Aluminium Cans: Used for beer and soft drinks

- The steel can is generally coated with a thin layer of tin which acts as a barrier between the steel and the food to minimise the risk of the food reacting with the steel.
- Foods with a high acid content require cans with special coatings to ensure the package is **inert**.
- It is not advisable to use the contents of dented or damaged cans because microscopic holes may be present.

Corrugations in the side and lid of the can provide strength and stability.



The double seam

The curl on the can end containing sealing compound and the flange on the can body are rolled flat, forming five folds of metal. The sealing compound between the folds gives an airtight seal.



The side seam

The edges of the can body are first hooked then flattened together. A final sealing is accomplished by soldering the outside of the side seam.



The notch

If the side seam were extended to the end of the can, there would be four folds of the metal to be included in the seam area. However, the body blank is notched, so only a double layer of metal extends into the double seam. This permits tighter sealing.



inside enamel coating

tin

tin-iron alloy

steel

tin-iron alloy

outside layer of tin

The tin plate

This cross-section shows the relative thicknesses of component layers of tin plate. Steel is the large segment. The first layer on either side is tin-iron alloy, and the second is tin. The inside surface is enamel coating.



TABLE 11.1 Different cans used for various foods

CLASS OF FOOD	CHARACTERISTICS	EXAMPLE
Strongly corrosive (often packaged in lacquered cans)	Highly or moderately acidic products	Berries and cherries, apple juice, tomatoes
Moderately corrosive (the can may sometimes be wholly or partially lacquered)	Mildly acidic products, often containing fruit products	Apricots and peaches, baked beans in tomato sauce
Mildly corrosive (food reacts with can only when stored in can after opening)	Low acid products or high protein products	Peas, corn, fish, meat

The qualities of the food affect the characteristics of the cans used to package them. These days a number of products that were once sold in cans are now packaged in glass.

ADVANTAGES

- Inexpensive packaging material that is widely used for a range of foods.
- Provides good protection for the contents and prevents undesirable gains or losses in moisture content.
- Easy to handle in terms of filling, sealing and packing.
- Can be displayed easily and stacked neatly on shelves due to their shape and size.
- They can be stored for long periods of time.
- Steel cans are impact resistant and virtually unbreakable.

GLASS CONTAINERS



2. Glass Containers

- Glass is used for a wide selection of semi-solid, liquid and solid foods.
- Glass jars are generally aseptically sterilised and hot-filled, allowing for vacuum sealing. If they have not been hot-filled, pasteurisation of high-acid food such as fruits and pickles is required.
- The contents of the glass container need to reach temperatures of at least 85 degrees celsius to destroy micro-organisms.
- Low-acid foods (such as; meat, fish and baby food) need to undergo sterilisation, and are required to be heated to much higher temperatures, so that all the micro-organisms are destroyed.
- Care must be taken when conveying glass through the filling process to prevent surface damage or breakage.

ADVANTAGES

- Is chemically inert, and does not react with foods to produce flavour changes.
- Is impermeable and non-porous.
- Is odourless and hygienic.
- Usually transparent, which permits the contents to be inspected at the time of packing and at the point of purchase.
- Has great strength.

- Is easy to open and to reseal to store unused contents.
- Comes in a wide variety of shapes, sizes and colours.
- Provides a means of long-term storage and extended shelf-life.
- Can be recycled or re-used.

PAPER AND CARDBOARD



3. Paper and Cardboard

- Paper packaging is used for a wide range of products because it is versatile and cost effective.
- It is suitable to treat paper to suit the type of product being packed.
- Greaseproof paper is normally used to package confectionary and butter. These offer a barrier to unwanted odours and moisture.
- Thicker paper-based packaging (paperboard) can be laminated (combining two or more layers of materials which are held together with an adhesive). These produce strength and moisture resistance. For example; boxes for frozen meals and Tetra Paks used for fruit juices.
- Pulped fibreboard offers protection for fragile foods such as; eggs.

TYPE OF PACKAGING	GENERAL INFORMATION	EXAMPLES OF PRODUCTS
Paper bags	The paper bag is one of the oldest and cheapest forms of packaging available. It is secure and provides protection from light and dust when sealed. One disadvantage is that it does not stand neatly on supermarket shelves without some type of support.	Cookies Sugar Flour
Paper sacks	The difference between paper bags and paper sacks is simply that paper sacks are made from thicker paper, which allows them to carry heavier weights.	Bulk flour Bulk rice Bulk bread rolls
Moulded fibreboard cartons	Paper is first pulped, then deposited into moulds and allowed to dry. A dense and hard container results. The containers can be moulded into different shapes, to suit the product being packed.	Egg cartons Dividers in fruit distribution Boxes Biodegradable trays
Board-based products	This type of packaging is made from board 0.5–1.0 millimetres thick. The carton provides a solid structure for the contents and has the benefit of easy stacking.	Cereals Cake mixes Biscuit boxes
Paperboard bricks	These bricks are made from wood pulp, layers of polyethylene and sometimes aluminium. Used with aseptic packaging, they contain processed food. They have an airtight seal and are unbreakable, but they are difficult to recycle.	Long-life milk Juice and other fruit drinks
Paperboard cartons	Cartons are made from wood pulp with a plastic lining. They cannot be reused.	Fresh milk Custards and other milk products
Composite containers	These containers use more than one material. The most common type used in food packaging is one that uses a paper body and a metal lid.	Milo containers Gravy canisters Snack food canisters
Corrugated boards	This is the most widely used form of packaging in the food industry. In most cases it is used as a secondary package to hold multiples of a prepackaged food.	Boxes used for bulk buying Boxes in which products are delivered

ADVANTAGES

- Paper/ Cardboard is inexpensive.
- Paper/Cardboard is inert.
- Paper/Cardboard is recyclable.
- Paper/Cardboard can be moulded to suit the shape of the food (e.g: egg cartons).
- Paper/ Cardboard is sometimes combined with metal for added protection. (e.g Pringles).

RIGID PLASTIC PACKAGING



4. Rigid Plastic Packaging

- The two types of plastic that are most commonly used to package food include; Polyethylene Terephthalate (PET) and High-Density Polyethylene (HDPE).
- PET is commonly used as a clear packaging where as HDPE packaging is stronger when coloured so it is normally opaque.
- PET is stronger and provides better long-term protection - used for soft drinks, water oils, sauces and spreads.
- HDPE is used for foods with a shorter shelf life - e.g milk.
- Some packages use a combination of plastics in their structure. For example; PET bottle with HDPE lid.
- Polypropylene (PP) is used for products requiring a hot fill such as; fruits in syrups.
- Polystyrene (PS) generally foamed before being used for insulating cups.
- All plastics carrying a recycling symbol have the potential to be recycled.

FLEXIBLE PLASTIC PACKAGING



5. Flexible Plastic Packaging

- Any plastic material that is formed into a sheet or reel and is up to 0.375 millimetres in thickness.








Plastic Film and Bags

- Polyethylene (PET) - used for clingwrap
- High-Density Polyethylene (HDPE) - used for some cereal box liners and shopping bags.
- Low-Density Polyethylene (LDPE) - used for shrink wraps, cake and cereal box liners.
- Polypropylene (PP) - used for packing snack foods such as; chips, biscuits and 2 minute noodles.

- Plastic is made by melting the raw materials of the plastic (small pellets) and forcing it into the desired shape through a process known as **extrusion**.

Laminations

- Lamination involves the combining of two or more materials from separate reels that are stuck together with the use of an adhesive or heat.
- Most plastic packaging materials are laminations.
- The shrinkable bags and films for **vacuum packing** are an example of laminates. The plastic must be able to shrink without cracking.

RECYCLING SYMBOL	PLASTIC TYPE	USES
	PET — polyethylene terephthalate	<ul style="list-style-type: none"> • Clear rigid bottles — e.g. water and soft drink bottles • Films — e.g. cling wrap
	HDPE — high-density polyethylene	<ul style="list-style-type: none"> • Opaque rigid bottles — e.g. 2 L milk bottles • Flexible sheets — e.g. cereal box liners
	PVC — Polyvinyl chloride UPVC — unplasticised polyvinyl chloride	Rigid bottles — not commonly used because of dangers when recycling
	LDPE — low-density polyethylene	Flexible packaging — e.g. films, shrink wrap, bags
	PP — Polypropylene	<ul style="list-style-type: none"> • Rigid moulded containers, jars and trays — heat stable so used for hot fills and <i>sous vide</i> • Flexible sheets for outer packages — e.g. biscuits
	PS — Polystyrene	<ul style="list-style-type: none"> • Insulating cups, trays and boxes (hot and cold) • Protective packaging
 OTHER	Includes all other resins and multi materials (e.g. laminates) able to be recycled from cars, aircraft and boats, furniture and electrical appliances	Major uses — agricultural piping, furniture fittings, wheels and castors, outdoor furniture, fence posts, pallets and marine structures

ADVANTAGES

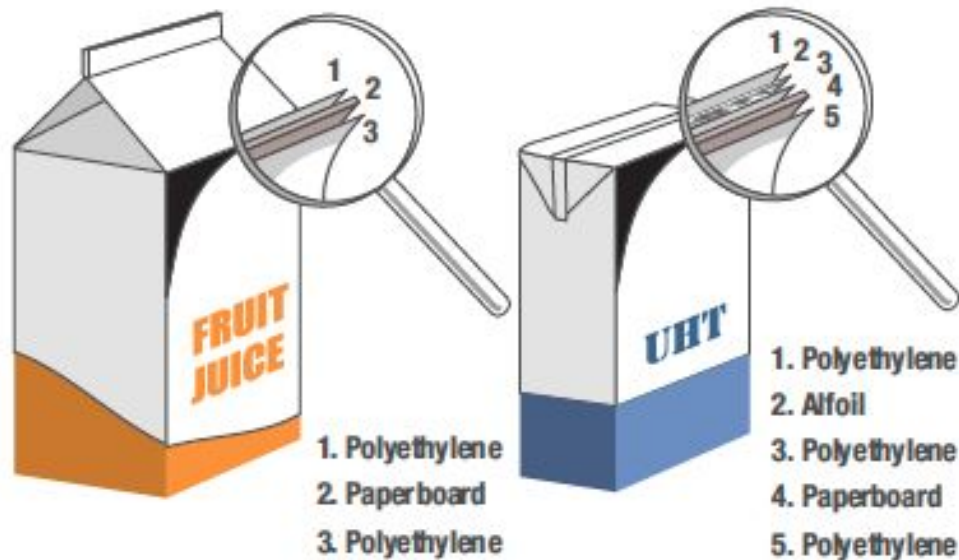
- Rigid packaging is light and strong.
- Available in a variety of colours, shapes and sizes.
- Relatively cheap to produce.
- Flexible plastic packaging is versatile and used for a variety of packaging uses.
- Laminates are strong and inert due to the use of an impenetrable plastic.

ALUMINIUM FOILS AND LAMINATIONS



6. Aluminium Foils and Laminations

- Most of the foils used for packaging these days is made from aluminium.
- Aluminium foils are used to create packaging for a variety of products such as; trays for frozen pastry products, tubes for long life products such as; condensed milk.
- Foils less than 0.15 millimetres are weak and are often combined with plastic and paper to add strength and stiffness. This is known as lamination. For example; muesli bar wrappers.
- Tetra Paks are multilayered laminations or **composite packages**.



Laminations provide protection for both the product and the package. Get a Tetra Pak and try to peel the layers to separate the different packaging materials: each layer has been included for a different purpose. Think carefully about characteristics of each packaging material and see if you can determine why each of the layers has been included.

ADVANTAGES

Aluminium laminations and foils are lightweight.

Foils can be strong depending on their thickness.

Aluminium laminations and foils are flexible.