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Research Article

Packaging for convenience and maintaining nutritional value of foods

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ABSTRACT
With the time, lives of consumers are getting busier and getting more demanding day by day. Due to lack of time, they look for convenient packaging which can save time, money and resources as well. So, to fulfill their demands, new trends are emerging in food packaging. Convenience packaging goes beyond the essential purpose of preserving and protecting the product. It includes resealable packets, small bags and pouches, shrink films and lidding films. Flexible packaging for convenience includes aluminium foils, films and papers. Packaging for maintaining and enhancing nutritional value of food includes edible films and coatings, made up of proteins, carbohydrates and waxes and lipids which protects the food as well as increases nutritional value of products.

Key words: Convenient Packaging, Edible Films, Coating.

INTRODUCTION:

Important new trends are emerging in food packaging. Consumers' lives are getting busier and more demanding by the day. They're asking for smarter packaging tailored to their needs to gain more time, more space and more leisure. They're also concerned about reducing waste and conserving natural resources[1]. The result is an increased demand for intelligently packaged food which are easy to handle, ready-to-eat, ready-to-cook and save energy and time[2]. Consumers demand for food packaging that looks great, easy to use and store, protects the contents, saves money, cuts down on waste and easy to dispose of after use.

Packaging: Packaging exists to deliver products to consumers in perfect condition. Well-designed packaging meets the requirements of the product while minimizing economic and environmental impacts of both the product and its package. Good packaging uses only as much of the right kind of material as necessary to perform this task.

Convenient packaging: Packaging exists to deliver products to consumers in perfect condition. Well-designed packaging meets the requirements of the product while minimizing economic and environmental impacts of both the product and its package. Convenience packaging goes beyond the essential purpose of preserving and protecting the product. Consumers want conveniently packaged food products that can be quickly made into meals without

sacrificing quality. This includes products displayed in supermarkets, eg. salad kits, zippered pouches, tea-bags, individual milk portions, sugar sticks and tomato sauce sachet that preserve shelf-life and maintain freshness[3].

Challenges: There are many challenges to solve the abovementioned purpose like, to preserve at best the quality of food products as well as increase shelf life of food products. Maximum protection to food products from environment should also be provided. Reduction of cost also matters.

Characteristics of convenient packaging: Convenient packaging should not only define convenience but also posses many qualities like, it also extends shelf life with barrier properties and maintains the food organoleptically acceptable. It incorporates frustration-free tear or opening features and minimizes chemical or physical deterioration. It creates infestation-free protection and reduces costly returns[4].

Classification of convenient packaging: Convenient packaging can be classified by the following way: Resealable package, pouches and bags, lidding films and shrink films.

Easy-Open/Reclose (Resealable) Package- It improves overall package functionality and enhance consumer convenience because it provides frustration free alternative which is easier to open, pour and store[5].

Pouches and Bags- Easy to store and pour. It is available in individual pack. It is ideal for sauce sachet, butter cubes, milk pouches.

Lidding Films- These films can go with aluminum (uncoated or lacquered), PP, PE, PS, PVC, paperboard, pulpboard/fibre trays. Lidding films can incorporate the following additional features: laser perforation, hot needle perforation, steam venting, macro hole perforation, peel seal or weld seal, low to very high gas barrier, suitable for pasteurisation/ hot fill, very high strength/ impact resistance, chilled/ frozen/ ambient

Shrink Films- These are of following types-

- Plain or printed multi-pack film for tray or pad-supported packages
- Corrugate-free film for unsupported packages
- Film for film-to-film applications and prevention of inter-package adhesion
- Perforated shrink film organizes, dispenses cans and bottles.

Characteristics of shrink films- It optimizes for high-speed operations and gives outstanding strength and durability.

Benefits- These are sustainable, economical multi-pack, ideal for replacing corrugate, paperboard and plastic rings for PET bottles, aluminum cans and more. It reduces packaging material more than 50% by weight lower the costs as much as 30%.

Shrink films are great for bundling aluminum cans, glass bottles, PET bottles, tetra Pak boxes and more in everything from convenience store to club store pack sizes. Applications include beer and adult beverage multi-packs, bottled water multi-packs, canned vegetables, juice box multi-pack, peanut butter multi-packs, pudding, soda/soft drink multi-packs, soup multi-packs, yogurt cup multi-packs.

Flexible packaging for convenience

Aluminium foils- It provides superior product protection. It has high strength alloys for high speed machine wrapping. It can be laminated to paper or plastic films using wax or adhesives. It can be reversed side coated in a heat sealable lacquer. It is supplied in reel or sheet form. It can be embossed with sophisticated patterns and specific logos.

Films- It may be of different types including coextruded film, cold-seal films, laminated films, metallized films, PCR content films, shrink films, steamable films.

Paper- A range of confectionery wrappers includes a wide variety of printed specifications and in some cases, combination with other materials. Printed and wax coated papers are available for twist wraps pre-made bags in paper and paper/plastics combinations.

Packaging for maintaining and enhancing nutritional value of food- edible films and coatings- Edible films are defined as a thin layer of material which can be consumed and provides a barrier to moisture, oxygen and solute movement for the food. The material can be a complete food coating or can be disposed as a continuous layer between food components. Edible films can be formed as food coatings and free-standing films[6].

Type of edible films and coatings-

Hydrocolloids, lipids, composite[7].
Application includes- Wrapping, brushing, spraying, immersing.

Composition of hydrocolloids- These are water based colloidal mixtures of proteins and/or polysaccharides. Proteins include casein, gelatin, wheat gluten–corn, soy and whey protein and polysaccharides include cellulose derivatives–alginates, pectins, starches etc.

Properties- It has poor resistance to water vapor but provides barriers to oxygen & carbon dioxide it has mechanical strength.

Lipid films- It includes films made up of waxes fatty acids, acetylated monoglycerides, sucrose fatty acid esters, shellac.

Properties- It provides barriers to water vapor. Coatings add gloss. It lacks structural strength & durability and requires supporting matrix. Many lipids exist in crystalline form.

Composite films

Bilayers- In which one layer is deposited over another layer.

Conglomerates- One layer includes a mixture of several components. It is again of two types- Components distinct and Components intermixing. For instance, lipids provide a barrier to water vapor movement and hydrocolloids provide the supporting matrix. So, the film having both properties is composite films. Another example is films of casein and acetylated monoglycerides which are effective barriers to water loss in fruits and vegetables

Effects of Edible Coatings: Edible coating reduces water loss and protects against contamination. Reduces gas diffusion and improves mechanical integrity. It encapsulates aroma compounds, antioxidants, pigments, vitamins etc. It reduces environmental pollution and establishes modified atmosphere.

Some examples of edible coatings- Nutre seal (modified cellulose polymers), Pro-long (sucrose polyesters of FA + Na salts of CMC), waxes, long-chain fatty acids like paraffin , shellac is a resin secreted by an insect, sealgum and spray gum (gum acacia & gelatin), nutri-save (carboxy methylchitosan)

Additives to enhance nutritive value- They modify mechanical properties of the film and cause significant changes in barrier properties. Components include antimicrobial compounds, antioxidants, flavor and aroma compounds, pigments, preservatives, vitamins.

Types of film additives

- Emulsifers - Keep the components in solution.
- Surfactants - Reduce the surface tension of the film formulation to achieve uniform coverage.
- Plasticizers - modify mechanical properties, water and relative humidity. For example, glycerol, polyethylene glycol and acetylated monoglycerides, sucrose.

Active packaging for convenience- Active packaging employs a packaging material that interacts with the internal gas environment to extend the shelf life of a food. Such technology modifies the gas environment and may interact with the surface of the food by removing gases from or adding gases to the headspace inside a package. Recent technological innovations for control of specific gases within a package involve the use of chemical scavengers to absorb a gas or alternatively other chemicals that may release a specific gas as required.

"Packaging in which constituents have been d eliberately includes substancein or on either t he packaging material or the package headspa ce to enhance the performance of the package system" [8]. Eg- sachet, flexible tubes etc.[9].

Some areas of atmosphere control in which active packaging is being successfully used-

Active Packaging
System Application

Oxygen scavenging
Most food classes
Carbon dioxide production
Most food affected by moulds
Water vapour removal
Dried and meld-sensitive foods
Ethylene removal
Horticultural produce
Ethanol release
Baked foods (where permitted)[10]

Modified atmosphere packaging for convenience- It is a practice of modifying composition of internal atmosphere of a package in order to improve shelf life of food product. There is modification in the

amount of oxygen which varies from 20.9% to 0% which slows down growth of aerobic organisms11. Oxygen is replaced with nitrogen or carbon dioxide, which lowers pH or inhibits growth of bacteria. Carbon monoxide can be used for preserving the red color of meat. Re-balancing of gases inside packaging can be achieved using active techniques such as gas flushing and compensated vacuum or passively by designing "breathable" films known as equilibrium modified atmosphere packaging (EMAP) [12].

Characteristics of packaging films for EMAP- Gas permeability, water vapour transmission rate, mechanical properties, transparency, type of package, sealing reliability[13].

Barrier films are designed to prevent the exchange of gases and are mainly used with non-respiring products like meat and fish. Permeable films are used for fruits and vegetables.

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