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A short review on recent technologies of food packaging

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ABSTRACT

The present article focuses on the active and intelligent packaging of fresh foods in food industry. There are several packaging techniques for storing fresh foods in the market and several new technologies developed with or without carbon dioxide absorbers which improves the quality and therefore increases the shelf life of the product. Fruit quality has been checked by using different spectroscopy techniques. Various intelligent packages have been developed which improves the freshness of the food. Nanotechnology methods are useful for detecting the spoilage of the food such as inks, adhesives and usage of oxide barriers. Hence these are useful for increasing the safety of the food to the consumer. These also include toxic free and edible packaging material. New methods such as 3mtm monitor in the future can increase the development of the packaging in the food sector.

Keywords: *Intelligent Packaging, Carbon Dioxide Absorbers, Spectroscopy Techniques, Adhesives, Oxide Barriers*

1. INTRODUCTION

In the past years packaging is mainly used for protecting the food material but in recent years it plays an important role in several aspects such as shelf life, marketing, brand protection and product nutritional information. It also stood as a socioeconomic indicator by the increased usage of the packaging. Food and beverage packaging comprises of 55% to 60% billion value of packaging.

2. HISTORY OF PACKAGING

In previous year's newspapers, cloth sacks are used for packaging the different meat products and sugar. Paper board boxes are used for massive marketing of several products. In 1800s canning of foods were developed to provide food for people working in army. Hence other products such as cellophane and polyethylene were developed. Cellophane was an attractive display packaging material mainly used for the growth of self-service stores. Polyethylene is a different plastic material which was developed during the period of World War II. Several other packaging materials such as glass, steel and paper acts as an alternative for packaging in 1950s. Packaging materials are widely used because of the properties such as they are less expensive, easy to produce, lighter in weight and they are also less expensive for shipment purpose.

3. IMPORTANCE OF PACKAGING

The main principle of packaging is to protect and preserve the food material from external contamination; hence it increases the shelf life and improves the quality of the food material. Packaging helps from heat, light, moisture, oxygen, pressure, insects, dirt and other gaseous material etc.; secondary functions includes the traceability properties, indication of tamper and control of portion. Packaging the food product in modified atmospheres has now been well developed [1]. Nitrogen and carbon dioxide are mainly used gases for the preservation of the food products such as coffee, cheese.

However, there are few gases which are permitted by the European community. Modified atmosphere packaging has its own principle to fulfil the customer needs. The packaging should be developed with high quality which should avoid the problems that are raised due to transportation. By decreasing the problems, the product must look attractive and fulfil the needs of the consumers [2]. Quality is the main consideration to increase the acceptance of the consumer. Another form of packaging is called controlled modified atmosphere packaging which involves oxygen, carbon dioxide and humidity to control the food product. Vacuum packaging includes oxygen which is useful for removal of air for the product but increase the rate of adverse changes such as autoxidation of fats which impacts the taste and aroma of the product. They also increase the development of moulds which can affect the freshness of the product. Methods such as oxygen scavengers, absorbers and emitters are used as active and intelligent packaging for the production of high quality of food which is safe for the consumer's health.

4. ACTIVE PACKAGING

It mainly removes the unwanted changes and releases the active compounds for the quality of the food product [3]. This helps in increasing the shelf life of the product. Active packaging will also help in preserving the food materials. Nano composite materials have been developed to prevent oxygen and carbon dioxide reaching food product. For example, researchers have developed new approaches to extend the quality and shelf life of the strawberries. Chlorine dioxide and ethylene moistures are used for active packaging [11]. Active packaging with less dose clo2 is treated as effective method for retaining the titratable acidity.

5. APPLICATIONS OF ACTIVE PACKAGING

5.1 Oxygen Scavengers

In any food packaged material the presence of oxygen can lead to the spoilage of the food and increases the rate of detererioration.it leads to the growth of moulds and fungus. These results in certain chain reactions such as oxidative reactions which can cause off flavours, improper changing of colour, decrease in the quality of nutritional value of the product. Oxygen scavengers can reduce the reactions that are caused by oxidative reactions [10].

They are present in the form of sachets in the head space of the product or present directly in to the packaging material. These scavenging methods are implemented to reduce the oxidative reactions and thereby reducing the concentration of the deterioration. The most common oxide used is ferrous oxide and others include ascorbic acid, nylons, unsaturated hydrocarbons and catechol's. They also include some enzymes such as glucose oxides [5]. Researchers found that oxygen scavengers have positive result for the preservation of the food and thereby increasing the shelf life of the product. Scavengers are mainly used and are placed in the form of sachets that are kept in the primary package and pressure label is fixed on the internal surface for the support of the product. Iron powder is also used and is applied to several other food components which have different moisture content. The usual type of absorbents includes z, fx, e and g. These are mostly available in Asian markets. They can also reduce the production of hexane and other volatile compounds in high fat food which reduces the rate of rancidity.

5.2 Atco Absorbers

These are readily available in the market in the form of sachets. It absorbs the oxygen and reduces the atmospheric oxygen level to 2.09% to 001%. It reduces the growth of bacteria by reducing the presence of oxygen. Carbon dioxide absorbers will also be added for high beneficial rate to reduce the MICROBIAL growth in certain products such as cheese, meat, poultry and baked goods [4].

5.3 Antimicrobials

Antimicrobials are used to increase the quality and safety of the food product by decreasing the contamination on the surfaces of the processed food. Silver ions are also used in the packaging of the food. They are in direct contact to the food but they move slowly and react with organics [7]. Silver coins along with antimicrobials are currently studied. Fresh storage containers which contain silver Nano particles are kept in the polypropylene based material which gradually decreases the growth of microorganisms. Ethyl alcohol is also used which is absorbed on silica and is emitted which is effective but leaves a bad odour [6].

Chlorine dioxide is effective against microorganisms but has several effects such as darkening of meat colour, blanching of green vegetables. Ethylene is a very good reactive compound which is used in several ways such as modification, adsorption and absorption. This is useful for commercial applications which are used for the removal of the ethylene. Examples of ethylene absorbers include potassium permanganate which are available in sachets present in storage chambers. These are not directly incorporated as it leads to toxicity of the product. Intelligent and active packaging is used for testing the quality of the food material in the packaged material. This packaging was developed along with the active packaging [8]. These are kept directly or incorporated inside or outside of the packaging materials. Examples include time and temperature indictors, identification of radio frequency and biosensors. Intelligent packaging is defined as a system that is capable of carrying intelligent functions such as sensing, recording, tracing, communicating and application of scientific logo to increase the shelf life of the product, quality of the product and it provides information and warning on the packaging material [9].

6. CONCLUSION

Food industry has been implementing several technologies which made packaging sector stood first in the current century. This improvements leads to increase the quality and safety of the food material. These innovations are been changing according to the preferences of the consumer. Active and intelligent packaging is mainly used for reducing the rate of oxidation, migration of water in the food product, suppression of microbial growth and decreases the volatile flavours and odours. Nanotechnology has also been developed to affect the packaging sector greatly.

New innovations such as active packaging, formation of barriers, and detection of pathogens made to increase the heights of packaging material. These recent technologies have great growth, which as improvised benefits to the producers and consumers. There are scavengers which help toxic free and edible packaging materials which work in shorter period useful for producers and consumers. Development of recent technologies such as 3mtm monitor packs has much scope in the food packaging field which is believed to be followed as a great development in the future.

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