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## IN THE AGE OF COVID-19, THE VALUE OF MODIFIED ATMOSPHERE PACKAGING

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The coronavirus has infected everybody and everything. This pandemic brings with it unprecedented threats in a variety of fields and economies. One of these issues was demonstrated by the earlier run-on retailers and food products: ensuring that supply chains remain stable, avoiding any shortages, spoilage, and pollution. Not only is there a pandemic, but also environmental problems that necessitate new ways of eating and manufacturing. Modified atmospheric packaging (MAP) is a beneficial preservation technology that allows fruits and vegetables to have a much longer shelf life. The MAP is the consequence of altering the composition of the atmosphere in the packing headspace as a consequence of the dynamic interaction between the packed product's metabolic activities, on the one hand, in which O<sub>2</sub> is consumed and other gases such as CO<sub>2</sub> and water vapour are created, and on the other hand, by transmitting all of these gases through the package.

### **Battle shortages by extending shelf life:**

Modified Atmosphere Packaging has proved to be an effective method for avoiding shortages. Border controls, labour limitations: the policies that various countries have implemented have an undeniable impact on the pace at which goods pass across the supply chain. This has serious ramifications, especially for perishable goods, which are susceptible to spoilage. Food ingredients have a longer shelf life when exposed to a modified atmosphere. It also keeps rodents and pollution at bay. Since containers are always travelling at a slower rate than average, these risks are increasing over time. Pests have no chance with MAP because it works from the inside out, making it ideal for longer storage and shipping.

### **The value of healthy food products:**

Many mechanisms are now in place to slow the transmission of the infection, ranging from mutual isolation to stringent lockdowns. Furthermore, as scientists push for healthier eating practises to improve immunity, access to healthy, organic fruits and vegetables is more important than ever. Modified Atmosphere allows consumers retain their nutritious value for a prolonged period of time, keeping them healthy and extending their shelf life long enough for them to meet their end customers while also retaining their health benefits and smell.

### **What exactly is modified atmosphere packaging (MAP)?**

Modified atmospheric packaging, or MAP, is what allows anybody in the food and gas business to maintain product quality, freshness, and shelf life. With the appropriate technology, you can safeguard the environment within your package while also boosting product quality-essential for everyone in this industry. Modified atmosphere packaging (MAP) is a material handling that involves altering the gaseous atmosphere around a food product inside a pack and using packaging materials and formats with a sufficient amount of gas barrier to keep the modified atmosphere at an appropriate standard for food preservation. Modified environment packaging, according to the Food and Drug Administration (FDA), "involves either consciously or passively manipulating or altering the atmosphere around the substance inside a container consisting of different forms and/or combinations of films."

The package's atmosphere can be changed passively or actively. The high concentration of CO<sub>2</sub> and low O<sub>2</sub> levels in the package in passive modified environment packaging are achieved over time as a result of product respiration and gas transmission rates of the packaging film. This procedure is often used for respiring fresh fruits and vegetables. Reducing O<sub>2</sub> and raising CO<sub>2</sub> lowers the rate of respiration, conserves stored energy, and hence extends shelf life. A transformed atmosphere is one that has been specially developed by modifying the normal distribution and composition of atmospheric gases. Active MA, on the other hand, involves the employment of active systems in the packaging film or container to adjust the environment within the package, such as O<sub>2</sub> and CO<sub>2</sub> scavengers or emitters, moisture absorbers, ethylene scavengers, ethanol emitters, and gas flushing. As applied to packaging, this entails altering or regulating the composition of gases found within each container in order to provide optimum conditions for increasing shelf life and reducing deterioration and spoilage of perishable food and beverage goods.

The gas mixture used for an MA package is determined by the kind of product, packing materials, and storage temperature. An MA package's atmosphere is mostly made up of altered quantities of N<sub>2</sub>, O<sub>2</sub>, and CO<sub>2</sub>. Reduced O<sub>2</sub> encourages the postponement of deteriorative events in foods such as lipid oxidation, browning reactions, and the growth of spoilage organisms. Low quantities of oxygen (3-5%) are used to reduce the rate of respiration in fruits and vegetables.

Formalized paraphrase However, in the case of red meat, large amounts of O<sub>2</sub> (80 percent) are utilised to decrease oxidation of myoglobin and retain the meat's beautiful brilliant red colour.

Updated environment packaging is classified into two types: passive and active. The FDA describes active modified atmosphere packaging as "the expulsion of gases in the container, which is then substituted by a desirable mixture of gases,"

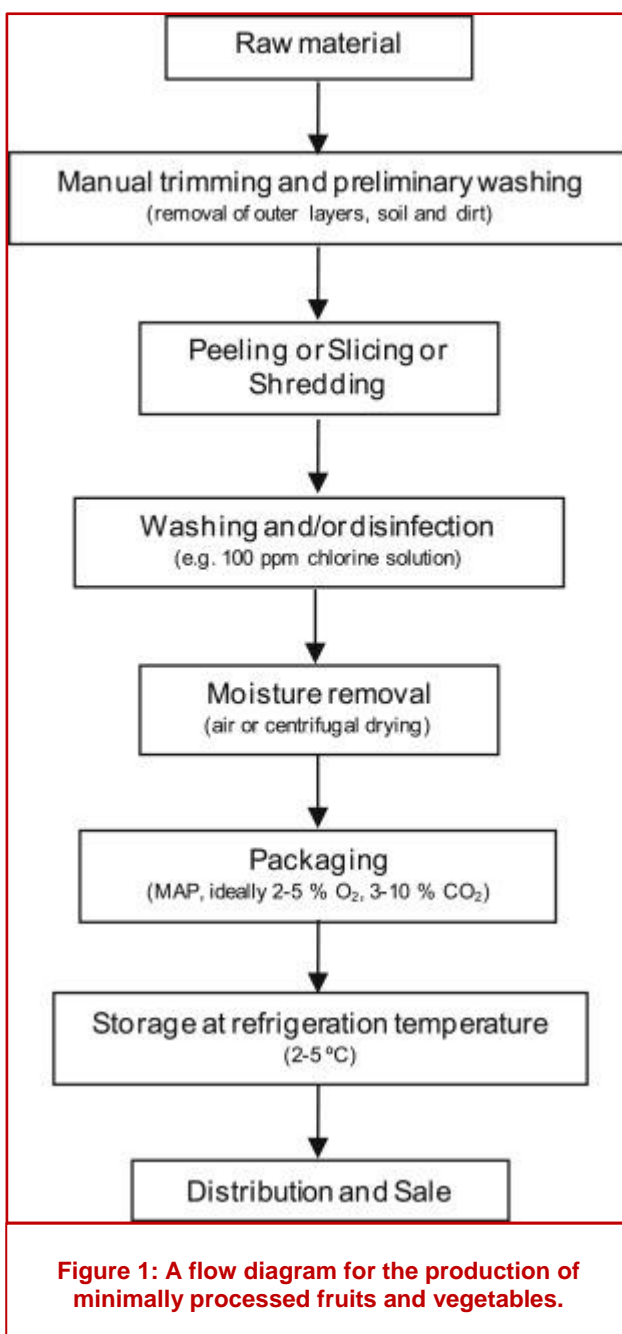
whereas, passive modified atmosphere packaging is "where the product is wrapped using a chosen film form, and the desired atmosphere forms naturally as a result of the products' respiration and gas diffusion through the film."

#### Materials for packaging:

Because they allow gases and water vapour to reach the correct environment, flexible films are often utilised for items such as fresh fruits, meats, fish, and bread. Pre-formed trays are formed and shipped to a food packaging company to be filled. The package headspace is then modified and sealed. In comparison to thermoformed packing materials, pre-formed trays are often more flexible and allow for a greater range of sizes since varied tray sizes and colours may be handled without risk of injuring the package. Thermoformed packaging, on the other hand, is delivered to the food packaging factory in the shape of a roll of sheets. At the packing station, each sheet is treated to heat and pressure before being produced. The packaging is then filled with the product and sealed after it has been formed. The benefits of thermoformed

packing materials over pre-formed trays are mostly cost-related: thermoformed packaging consumes 30% to 50% less material and is delivered as rolls of material. This will result in huge cost savings in production and shipping.

The major factors to consider while selecting packaging films for MAP of fruits and vegetables are gas permeability, water vapour transmission rate, mechanical qualities, transparency, package type, and sealing reliability. LDPE (low-density polyethylene), PVC (polyvinyl chloride), EVA (ethylene-vinyl acetate), and OPP (oriented polypropylene) packaging sheets are not permeable enough for rapidly respiring items such as fresh-cut fruit, mushrooms, and broccoli. Because fruits and vegetables are respiring items, gases must be



transmitted through the film. Permeable films are those that have these qualities. Other films, known as barrier films, are designed to restrict gas exchange and are typically used with non-respiring items such as meat and fish.

**MAP packaging has a few advantages:**

- Improved product control may help sellers assure product quality.
- Increased shelf life
- Increased product availability
- Costs are being decreased.
- Longer cycles of freshness
- Waste removal with less work
- increased manufacturing capacity

**Disadvantages of Modified Atmosphere Packaging:**

While MAP packaging can help to extend the life of a product, it does not remove all microorganisms. As a result, other means of preservation must still be applied. Bacteria continue to proliferate, particularly in higher temperatures. As a result, it is suggested that items be refrigerated even after they have been packaged using MAP techniques. When a package is opened, its contents have a typical shelf life. This is something to keep in mind while selling, purchasing, or keeping MAP packaged goods.

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