

Modified Atmosphere Packaging vs. Controlled Atmosphere Packaging

Most people make a distinction between MAP and CAP and use them interchangeably. Both MAP and CAP refer to the use of gas mixtures other than ambient air inside a flexible package or rigid container. Definitions for MAP and CAP are as follows:

Controlled Atmosphere Packaging: A defined mix of gases is maintained or **controlled** over time by some external apparatus or internal chemical reactions. An example of a controlled atmosphere is the Transfresh container (used for ocean transport of fruit) which has a mechanical means of measuring the container atmosphere and adjusting the gas levels to maintain a predetermined mixture of CO₂, O₂ and N₂ during shipment. Placing an oxygen absorbing sachet inside a barrier package is an example of a controlled atmosphere package using a chemical reaction. The sachet absorbs any oxygen that transmits through the package barrier. Sulfur dioxide producing pads used in long term shipment or storage of table grapes to prevent growth of gray mold are another example of controlling package atmosphere.

Modified Atmosphere Packaging: Gas atmosphere is **modified** by (1) direct injection of gases (often CO₂ or nitrogen) into a package, (2) evacuating air from the package or (3) interaction between package contents and the air in the package causing the package atmosphere to modify over time. The latter is what happens with fresh fruit and vegetables. With proper packaging, the natural respiration of produce causes O₂ levels to drop and CO₂ levels to rise. Modified atmosphere packages have an atmosphere different from ambient air but, that atmosphere can change over time. In the case of produce, package atmosphere is affected by the transmission rates of the packaging material and changes in storage temperatures. Higher temperatures lead to higher respiration rates, creating lower O₂ levels in the package atmosphere and higher concentrations of CO₂. Hence, the atmosphere inside the package is **modified** but not **controlled**.

Are Micro-CAP™ bags MAP packaging or CAP packaging? Micro-CAP™ technology falls more into the **MAP category** because the atmosphere inside the bag will change over time and with changes in storage temperature. Although, you can say that placement, size and number of micro-perforation holes in each Micro-CAP™ bag is designed to maintain or **control** the oxygen and carbon dioxide mixture inside the bag at an optimum level to maintain quality and prolong shelf-life of each individual type of produce. The size and number of micro-perforations required for Micro-CAP™ bags is impacted by variables such as the variety of produce, size/weight of package, film permeability, storage temperature and in the case of processed produce, the cut size. Smaller cuts with greater surface area have a higher respiration rate than larger cuts with less surface area.