



# ***Modified Atmosphere Packaging***

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# What is Shelf Life?



- ▼ Time after production during which product remains “*acceptable for consumption*”
  
- ▼ It must:
  - ✓ Be safe
  - ✓ Retain desired sensory, chemical, physical and microbiological characteristics
  - ✓ Comply with any label declaration of nutritional data when stored and handled under the recommended conditions

# Modified Atmosphere Packaging (MAP)

*A leading means for food preservation*



- ▼ Food packaging preservation *application* in which earth's breathable atmosphere has been modified in some way
- ▼ Usually combined with lowered temperatures

## **FACT!**

Earth's atmosphere primarily consists of Nitrogen (78%), Oxygen (20.96%), Argon (1%), Carbon Dioxide (0.04%), trace inert gases and water vapor. Changing this balance results in a modified atmosphere.

# Advantages of MAP



- ▼ Maintain freshness
- ▼ Extends *Shelf life* of product 50-500%
- ▼ Extends production run with fewer changeovers
- ▼ Reduces need for artificial preservatives  
Consumer preference for healthier food
- ▼ Enhancement of sales appeal, attractive color and presentation
- ▼ Allows centralized packaging and increased distribution possibilities

# Typical Gases Used for MAP



- ▼ **Carbon Dioxide (CO<sub>2</sub>)** —Inhibits the growth of most aerobic bacteria and moulds.
- ▼ **Nitrogen (N<sub>2</sub>)** —Inert gas (no active properties) is used to exclude air, and particular, oxygen.
- ▼ **Oxygen (O<sub>2</sub>)** —Oxygen is generally excluded in packages but often used in controlled quantities to maintain fresh, natural color in red meats; maintain respiration in fruits and vegetables.
- ▼ **Carbon Monoxide (CO)**— Used sparingly in some meats and fish to preserve the retention of color.

# Packaging Requirements



- ▼ High barrier packaging films
- ▼ Airtight seals
- ▼ No unwanted package leaks

# MAP Packaged Products



- ▼ Ready meals
- ▼ Fresh whole and fresh-cut fruits and vegetables
- ▼ Cooked fruits and vegetables
- ▼ Meat (cooked and raw)
- ▼ Poultry (cooked and raw)
- ▼ Seafood (cooked and raw)
- ▼ Cheese
- ▼ Fresh pasta products
- ▼ Bakery items
- ▼ Snack foods
- ▼ Liquid food and beverages
- ▼ Pet food
- ▼ Combo products (pizza)

# Fats and Oils - MAP Benefits



- ▼ Oxygen removal - deter rancidity
- ▼ High barriers and seals keep oxygen out
- ▼ Maintains freshness
  - ▼ Nuts - chips - other oil foods

# No-Fat/Low Fat Issues



- ▼ MAP process especially beneficial
- ▼ Fat has a function
  - Manages flavor and aroma intensity
  - Contributes to stability
  - Masks off flavors and aromas
- ▼ No and Low fat retain flavor poorly

# The Core MAP Technologies



# Food Processor Questions



- ▼ What's the cause of my product spoilage?
- ▼ What should my expected shelf life be?
- ▼ What should my gas mix be?
- ▼ How much gas will I consume?
- ▼ How can I optimize my MAP process?
- ▼ Is my MAP process safe?
- ▼ How can I reduce or avoid product rework?
- ▼ How can I improve product consistency?
- ▼ What is best means to monitor and measure my Mapped products?

# Marketplace Gaps & Needs



- ▼ No one single source MAP expert
- ▼ Vendors of MAP products tend to focus exclusively on their product and technologies
- ▼ Food processors are tasked with equipment and technology selection & integration of MAP process
- ▼ 50% of all MAP systems experience integration issues including some failures
- ▼ 80% of the Food processors are small to medium sized businesses

# Solutions for MAP Process Gaps



## 1. Gas Supply & Storage System

- Purity & mixture accuracy
- Volumes and Storage capacity
- Pressure & flow rates

## 3. Food Science Expertise

- Food Safety; Gas mixtures
- Modes of deterioration
- Shelf Life studies

## 5. MAP Package Validation

- MAP Gas Analyzers
- Leak/Heat seal testers
- Lab Studies, MAP Audits

## 2. Packaging Machine

- Package compatibility
- Flush and Line speeds
- Package sealing

## 4. Film

- Materials and design
- Barrier properties
- Package atmosphere

# Common MAP Solutions



## Product

Nuts	100%N <sub>2</sub>	Deter rancidity
Natural Cheese	CO <sub>2</sub> /N <sub>2</sub>	Deter mold
Coffee	N <sub>2</sub> /CO <sub>2</sub>	Deter Oxidation
Meat	CO	Deter Oxidation/ Maintain Color

# MAP Gas Mixtures Vary



## Product

	<u>O2%</u>	<u>CO2%</u>	<u>N2%</u>	<u>CO%</u>
▼ Raw red meats	70-80	20-30 (mix is known as high ox)		
▼ Raw red meats	20-30	70-80		.4
▼ Raw poultry		30	70	
▼ Raw fish/seafood (low fat)	30	40	30	
▼ Cooked, cured, processed meat		30-40	60-70	
▼ Ready meals		30-50	50-70	
▼ Dried food/snacks			100	
▼ Fresh pasta products		50	50	
▼ Bakery		50-100	0-50	
▼ Dairy				
--Hard cheeses		100		
--Soft/shredded		30	70	
▼ Fresh whole and prepared fruit	5	5	90	

# Why Invest in MAP?



- ▼ MAP preserves food products in a way consistent with consumer preferences
- ▼ MAP technology and application applies to many food segment products
- ▼ Growing recognition that MAP is an effective method for extending shelf life
- ▼ New product applications are continually being introduced
- ▼ Demand for MAP products is expected to grow at CAGR of 4.4% through 2014
- ▼ MAP significantly impacting distribution systems and market strategies

# How MOCON Helps



- ▼ Barrier determination
- ▼ In-Line monitoring of gases
- ▼ Headspace analysis
- ▼ Modes of food deterioration
- ▼ Shelf life modeling and accelerated aging studies
- ▼ Shelf life optimization
- ▼ Gas mix optimization
- ▼ Aerobic bacteria counts
- ▼ One stop testing partner for total package integrity

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# Next Month's Webinar



## Food Safety Testing Systems July 13<sup>th</sup> – 10am Central

(please note this is a topic change from our original schedule)

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