

# Freshline® Modified Atmosphere Packaging (MAP) for raw fish and seafood



Fish is perishable because of its natural properties such as high Water Activity (Aw), neutral pH value, and the presence of autolytic enzymes. MAP can help slow down the growth rate of spoilage bacteria, while low temperature helps slow down bacteria growth and enzyme activity. So when MAP is used in conjunction with careful temperature control, shelf life can be nearly tripled. In a marketplace in which the consumer values chilled over frozen fish, MAP produces significant benefits to both the retailer and the consumer -- resulting in a product that is safe, looks good, smells good and tastes good far longer.

Fish products can be subdivided into three major types:

## White fish (such as cod, haddock, plaice, sole, halibut, whiting, skate, swordfish, shark and hake)

Low in fat, this product benefits from a high carbon dioxide concentration and the presence of some oxygen. Oxygen prevents the growth of organisms like the anaerobic *Clostridium botulinum* type E and can also prevent color changes and bleaching.

Retail: 40% CO<sub>2</sub>/30% N<sub>2</sub>/30% O<sub>2</sub>  
Bulk: 70% CO<sub>2</sub>/30% N<sub>2</sub>\*

## Oily fish (such as herring, mackerel, salmon, trout, sardines and whitebait)

High in unsaturated (Omega 3) fatty acids, this product is particularly prone to oxidative rancidity. This problem can be substantially reduced by excluding oxygen and using nitrogen as a filler.

Retail: 40% CO<sub>2</sub>/60% N<sub>2</sub>  
Bulk: 70% CO<sub>2</sub>/30% N<sub>2</sub>\*

## Crustaceans and mollusks

(such as shrimp, lobster, crab, squid, mussels, and cockles)

As with oily fish, carbon dioxide is used in the MAP of crustacea to inhibit the growth of aerobic bacteria. Care must be taken not to use too high a proportion of carbon dioxide as this can lead to pack collapse, excessive drip and an acidic taste. Shelf life can be extended by up to four days when stored at 32°F.

Retail: 40% CO<sub>2</sub>/30% N<sub>2</sub>/30% O<sub>2</sub>  
Bulk: 70% CO<sub>2</sub>/30% N<sub>2</sub>\*

Whatever the fish, a product to gas ratio of 1:2 is recommended.

The lower the temperature, the more carbon dioxide can dissolve in the fish and, therefore, the greater and more long-lasting its effects. In cod fillets stored in 40% CO<sub>2</sub> at 32°F, a shelf life between 10 to 17 days could be achieved.

The most popular MAP retail pack for all seafood products is a clear, preformed, semirigid tray that is hermetically sealed to a clear, flexible barrier lid.

\* Please contact us to obtain a copy of the MAP booklet, or visit our MAP website for details:  
<http://www.airproducts.com/Food/content/MAP/MAP-gas-selector/default.asp>

## Ask Air Products . . . and expect more.

Whether your packaging, cooling, chilling or freezing applications include bakery goods, fruit and vegetables, poultry, meats, ready meals or anything in-between, Air Products' Freshline solutions offer you the high-purity gases and equipment, the international supply capability, and - most important - the unmatched industry experience and technical support to help you succeed, just about anywhere in the world. We can help you improve your productivity, lower your costs, maximize your returns, and, as a result, help make you more competitive in a very competitive market.

For more information on Freshline modified atmosphere packaging, or any of our Freshline offerings, call Air Products today to speak with a food industry expert, or visit us at the website below.



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