Making our world more productive

MAPAX® – Best for dry foods

Linde's MAPAX® portfolio meets today's food preservation challenges with bespoke gases and mixtures, application expertise and complementary installation, test and safety services.

The key to keeping dry foods fresh

Drying food to preserve it is a time-honoured practice. Everything from tea, coffee and spices through milk and cocoa powder to dried fruit and beans can be dehydrated to prevent spoilage. However, these dried foods still contain unsaturated fats of varying concentrations. This makes them sensitive to oxidation and rancidity.

The role of oxygen

Even small amounts of oxygen in food packaging may compromise quality and make dried products impossible to sell. The oxygen concentration thus has a major impact on the shelf-life. The oxidation process can be effectively inhibited with a modified atmosphere, which involves replacing oxygen in the package with nitrogen, carbon dioxide or a mixture of the two. Packages containing particularly sensitive dry foodstuffs, such as powdered milk for babies, should have oxygen levels of less than 0.2%. As light can have a big effect on oxidation reactions, the modified atmosphere packaging (MAP) of dried foods should ideally also act as a light barrier.

Recommended gas mixtures for dry foods

Product	Gas mixture	Gas volume / Product volume	Typical shelf-life Air	Typical shelf-life MAP	Storage temp.
Instant tea	100% CO_2	50–100 ml / 100 g prod.	5 days	20 days	20–25°C
Dry coffee (ground)	N_2 or CO_2	50–100 ml / 100 g prod.	4 weeks	24 weeks	20–25°C
Milk powder	100% N_2	50–100 ml / 100 g prod.	12 weeks	52 weeks	20–25°C
Nuts	100% N_2	50–100 ml / 100 g prod.	12 weeks	52 weeks	20–25°C
Crisps	100% N_2	50–100 ml / 100 g prod.	5 days	20 days	20–25°C
Dry soup	100% N_2	50–100 ml / 100 g prod.	5 days	20 days	20–25°C

The role of water

Deterioration reactions in food are also influenced by water activity. This is not the same as water content. Water activity refers to the rate at which water becomes available for microorganism, chemical and biochemical reactions. It is defined as the ratio between the vapour pressure of a product and the vapour pressure of pure water under the same conditions. Hence a low level of water activity will help to prevent microbiological spoilage. Moisture also has a big impact on the appeal of dried snacks. Consumers expect their snacks to be crispy, which means the packaging must provide a barrier against water vapour.
In the case of dried soups and instant drinks, water vapour is similarly problematic as it causes powders to clump and look unappetising. Here also, MAP with a moisture barrier can help avoid these undesirable effects.

MAPAX for coffee – protecting valuable aroma and flavour.

Protecting form and flavour

A modified atmosphere not only keeps dried fruit and snacks crisp and fresh, it can also help protect the goods. The gas cushion forms a protective shield around sensitive products, making sure they reach the consumer undamaged. And in the case of products such as coffee, where aroma plays such an important role in the perception and experience of the consumer, an impermeable modified atmosphere can help lock in flavour and aroma.

Perfect balance for dried foods

With MAPAX®, Linde has developed a range of modified atmospheres specifically to address the challenges involved in preventing spoilage of dried foodstuffs. Our MAPAX application engineers would also be happy to help you run detailed tests to establish the optimum gas mixture and packaging properties for your dried foods. By optimising properties such as permeability, gas barrier and mechanical strength, you can extend shelf-life by valuable weeks and months.

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