

Food Preservation: Food Safety & Hygiene Level 2

Food preservation can be achieved through:

- Low temperatures
- High temperatures
- Dehydration
- Chemical methods (e.g. salt, sugar, vinegar)
- Physical methods (e.g. vacuum packing, smoking)



Preservation Methods

Chilling

Refrigeration is a common method of preserving food. Generally, the colder the temperature, the slower bacteria will multiply. Fridges should be between 1°C and 4°C, although some micro-organisms (particularly spoilage organisms) can grow at these temperatures.

Freezing

Freezing preserves food by reducing the moisture in the food. If poorly packaged, frozen food will continue to lose moisture during storage and the surface of it will dry out (known as freezer burn). Freezing should be fast to maintain the quality of the food. This prevents the formation of large ice crystals. Commercial freezing can reduce food temperature to -20°C within 30 minutes.

Methods of industrial freezing:

- Air blast freezing (used for ready meals, meat/fish products, confectionery products)
- Fluidised bed freezing (widely used for small vegetables, e.g. peas)
- Plate freezing (used for blocks of food, e.g. fish fillets)
- Cryogenic freezing (an expensive method using liquid nitrogen. Restricted to high-value products such as prawns, raspberries, strawberries)

Please note: toxins and spores are not affected by freezing. Moulds and yeasts need less moisture to grow than bacteria and are more likely to grow in frozen food.

Cooking

Bacteria should be killed if food is cooked thoroughly and its core temperature reaches at least 70°C for two minutes. But beware of recontamination, and the survival of spores and toxins. To avoid recontamination, food that is used straight away needs to be kept hot (above 63°C) or cold (ideally below 5°C, legally below 8°C).

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Canning

Canning is designed to kill *Clostridium Botulinum* spores. You need to reach a combination of 121°C for at least three minutes depending on the pH, density and available water/water activity (aw) of the food. This is known as the 'botulinum cook'.

Pasteurisation

Pasteurisation is the mildest form of heat treatment. It involves heating food to relatively low temperatures for a short time. For example, milk is heated 72°C for 15 seconds. Pasteurisation will kill most pathogens such as *Salmonella* and *Campylobacter*, but toxins and spores will survive.

Ultra Heat Treatment (UHT)

UHT is achieved by heat-treating a product to 135°C for one second and then filling into pre-sterilised packaging. It's designed to increase the shelf life of unrefrigerated products (e.g. milk/cream) to about six months without affecting its nutritional content.

Sterilisation

Sterilisation normally destroys all microorganisms and their spores and often involves temperatures over 100°C. It can affect the taste and nutritional value of the product. 'Commercial sterility' means that a product may not be completely free of microorganisms, but they are unlikely to cause problems during storage.

Dehydration

Dehydration preserves food by reducing the amount of water available to bacteria, yeasts and moulds. The availability of water is referred to as water activity (aw). Most bacteria need an aw of at least 0.95 and very few can exist below an aw of 0.6. Dried food usually contains less than 25% moisture and has an aw of less than 0.6. Dehydration can be achieved by:

- Sun-drying (e.g. currants/figs)
- Artificial drying (e.g. spray drying, roller drying, tunnel drying)

Dehydration of food will kill most bacteria but spores will survive so, after reconstitution, good food hygiene is required.

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Salt

Salt is used in curing, brining and pickling to preserve food and enhance its flavour. The preservative effect of salt is partly due to osmosis. Salt absorbs the water - making it unavailable to bacteria and moulds.

Sugar

Sugar is used to preserve condensed milk, certain cakes, candied fruit, jam and conserves. It's used in a similar way to salt, but the amount of sugar needs to be approximately six times higher to have the same effect.

Pickling

Bacteria will not multiply below pH 4.5. Spores will survive below pH 4.5, but can only germinate above pH 4.5. So foods can be preserved using vinegar (acetic acid) which sits at pH 3. Pickling is popular for cauliflower, peppers, carrots, onions and gherkins.

Physical Preservation

Vacuum Packing

Spoilage can be slowed down if you adjust the amount of oxygen in the air surrounding food. Air can be removed by vacuum packing, or replaced (modified atmosphere packaging). To achieve a good shelf-life extension, food in this packaging needs to be refrigerated.

Smoking

The preservative effect of smoking is partly due to dehydration. See the product label for information on keeping smoked foods; they are usually refrigerated.