

Preservation of Food

Is the process of treating and handling food to stop or greatly slow down spoilage (loss of quality, edibility or nutritive value) caused or accelerated by microorganisms. Some methods, however, use benign bacteria, yeasts or fungi to add specific qualities and to preserve food (e.g. cheese). Maintaining or creating nutritional value, texture and flavour is important in preserving its value as food. This is culturally dependent, as what qualifies as food fit for humans in one culture may not qualify in another culture. Preservation usually involves preventing the growth of bacteria, fungi, and other microorganisms, as well as retarding the oxidation of fats which cause rancidity. It also includes processes used to inhibit natural ageing and discoloration that can occur during food preparation such as the enzymatic browning reaction in apples after they are cut. Most foods contain enzymes or natural chemicals, such as acids or alcohols that cause them to begin to lose desirable characteristics almost immediately after harvest or preparation. In addition, a host of environmental factors, such as heat and the presence of microorganisms, acts to change foodstuffs in ways that may harm the food product. Food preservation traditionally has three goals:

- 1- The preservation of nutritional characteristics
- 2- The preservation of appearance
- 3- A prolongation of the time that the food can be stored.

Traditional methods of preservation usually aim to exclude air, moisture, and microorganisms, or to provide environments in which organisms that might because spoilage cannot survive.

Classification of Food preservation:

Some preservation methods require the food to be sealed after treatment to prevent recontamination with microbes; others, such as drying, allow food to be stored without any special containment for long periods. Common methods of applying these processes include drying, spray drying, freeze drying, freezing, vacuum-packing, canning, preserving in syrup, sugar crystallization, food irradiation, and adding preservatives or inert gases such as carbon dioxide. Other methods that not only help to preserve food, but also add flavour, include pickling, salting, smoking, preserving in syrup or alcohol, sugar crystallization and curing. Preservation processes include:

- Heating to kill or denature micro-organisms (e.g. boiling)
- Oxidation (e.g. use of sulfur dioxide)
- Toxic inhibition (e.g. smoking, use of carbon dioxide, vinegar, alcohol etc)
- Dehydration (drying)
- Osmotic inhibition (e.g. use of syrups)
- Low temperature inactivation (e.g. freezing)
- Ultra high water pressure (e.g. freshersised, a kind of “cold” pasteurization, the pressure kills naturally occurring pathogens, which cause food deterioration and affect food safety).

Chemical Reactions of Food and its Preservatives

Since it is probable that many reactions to food additives are not diagnosed, the exact rate of reactions is not known. However, various studies estimate that the rate

is probably less than 1% of adults, and up to 2% of children. There are many types of reactions that can occur as a result of food additives. Some of these reactions suggest an allergic cause while many others do not appear to be allergic, but rather an intolerance. Reports of reactions to food additives have included the following:

Skin, urticaria/angioedema, atopic dermatitis, sweating, itching, flushing,
Gastrointestinal, abdominal pain, nausea/vomiting, diarrhea,

Respiratory, asthma symptoms, cough, rhinitis,

Musculoskeletal, muscle aches, joint aches, fatigue, weakness,

Neurologic, behavior and mood changes, attention deficit and hyperactivity disorder, migraine headaches, numbness,

Cardiac, palpitations and arrhythmias.

A diagnosis of allergy to food additives is suspected when a person experiences various reactions to prepared foods or when eating at restaurants, but not from foods prepared at home. Various seemingly unrelated foods might in fact have common ingredients, such as food colorings or preservatives. Once a food or food additive is suspected, allergy testing (using skin testing or RAST) may be possible to certain natural substances such as annatto, carmine, and saffron. Testing for synthetic substances is not possible or reliable, and therefore a trial of a preservative-free diet may support a diagnosis of food additive reactions

What Preservatives Cause Reactions?

- Sulfites are common preservatives used in various foods, and are well known to cause a variety of symptoms.

- Nitrates and Nitrites: These additives are used as curing agents in meat products. Few reports of reactions to nitrates and nitrites exist, and include urticaria, itching and anaphylaxis.
- Benzoates are used in foods as antimicrobial preservatives, and have been responsible for worsening asthma, allergic rhinitis, chronic urticaria, and flushing in some people.
- Sorbates/sorbic acid are added to foods as antimicrobial preservatives. Reactions to sorbates are rare, but have included reports of urticaria and contact dermatitis

Canning food

Canning is a method to preserve food for long-term storage by sealing it in an airtight container. Because the food is sealed airtight, chemical preservatives are rarely required. Instead, a variety of methods are used to prevent the food from spoiling, such as heating, freezing or drying.

Generally, low-acid foods like vegetables, seafood and meats require sterilization at high temperatures to kill harmful bacteria. These temperatures can only be reached by creating steam while under pressure using a pressure canner. High-acid foods, like fruits or can be safely canned in a boiling water bath since the acidity of the foods gives additional protection against bacteria. That's great, but it hardly answers our question of whether or not canned foods are good for you. Canning provides a cheap and convenient option for long-term food storage. Because canned foods are mass-produced, they are often cheaper than fresh. Adding to that, canned foods can also be stored safely for several years. High-acid foods like tomatoes and fruits can be stored for up to 18 months while low-acid meats and vegetables can be stored anywhere from two to five years. To be safe, though,

canned foods should be stored in a cool, clean and dry place, and never above the stove, under the sink or in a damp garage or basement. Canned foods may contain deadly bacteria, while extremely rare, canned foods may contain a dangerous toxins produced by the heat-resistant *Clostridium botulinum* bacteria. Even a small dose of botulinum toxin can cause the deadly paralytic illness known as botulism. Thankfully, the canning process produces temperatures high enough to kill the botulism-causing bacteria. Unfortunately, however, contamination is still possible if the integrity of the can is compromised in some way.

Food Additives

In its broadest sense, a food additive is any substance added to food. Legally, the term refers to any substance the intended use which results or may reasonably be expected to result-directly or indirectly-in its becoming a component or otherwise affecting the characteristics of any food. This definition includes any substance used in the production, processing, treatment, packaging, transportation or storage of food. Food additives are also substances added to food to preserve flavor or enhance its taste and appearance. Some additives have been used for centuries; for example, preserving food by pickling (with vinegar), salting, as with bacon, preserving sweets or using sulfur dioxide as in some wines. With the advent of processed foods in the second half of the 20th century, many more additives have been introduced, of both natural and artificial origin. Food Additives are defined by the United States Food and Drug Administration (FDA) as “any substance, the intended use of which results or may reasonably be expected to result, directly or indirectly, in its becoming a component or otherwise affecting the characteristics of any food”. In other words, an additive is any substance that is added to food. Direct additives are those that are intentionally added to foods for a specific

purpose while indirect additives are those to which the food is exposed during processing, packaging, or storing.