

Food preservation

Objectives of food preservation:

- To prevent and remove microbial contamination
- To inhibits microbial growth.
- To kill contaminating pathogens
- To minimize food spoilage, food infection and food poisoning.

Methods of food preservation

1. Pickling

Food preserved in vinegar. Preserves meat and vegetables due to the action of acetic acid which prevents microbial growth

2. Salting

The process of removal of water from food. Preserves fish and meat in salt prevent microbial growth.

3. Smoking

Smoking of fish and meat prevent spoilage by dehydration. The wood smoke contains large numbers of compounds, which are antimicrobial and slow rancidification of fats.

4. Canning

It is a method of preserving food in which the food contents are processed and sealed in an airtight container at high temperature. Foods preserved in canned are meat ,fish ,fruits ,vegetables

5. Bottling

It is a method of preserving food in which the food contents are processed and sealed in airtight bottles at high temperature. Liquid foods preserved in bottle are milk, etc,

6. Pasteurization

It is the process of heating milk or any liquid or a food to kill pathogenic bacteria to make the food safe to eat. Pasteurization process named after Pasteur who is introduced the technique.

7. Sterilization

To remove microbes from food, milk sterilization by boiling at 100C

Note: The difference between sterilization and pasteurization is that sterilization is a method used to kill all microorganisms and their spores, whereas pasteurization is the method that is used to kill only the vegetative form of the bacteria where the spores survive.

8. Refrigeration: Keeping food at low temperature or cold.

The foods remain unspoiled in refrigerator at 4C. Deep freezers at -60C are good for storing meat and fish.

9. Dehydration: The process of removal of water from food

Simplest and cheapest method to prevent microbial growth due to lack of water. Fish and fruits can be stored

10. Lyophilization

Rapid freezing and dehydration of frozen product under vacuum.

11. Radiation(cold sterilization).

UV rays, beta rays, gamma rays widely, used in food preservation to control and prevents microbial growth.

12. Chemical additives

Food additives are substances added to food to preserve flavor or enhance its taste and appearance or prevent spoilage via inhibit microbial growth. Acetic acid, lactic acid, and benzoic acid used legally to preserve food. Nitrates and nitrites preserve meat colour.

13. Biological processing: Fermentation

Chemical preservation

Chemical preservatives

Chemical preservatives are defined as **the substances** capable of **inhibiting, delaying, or arresting the growth of microorganisms or any other deterioration resulting from their presence**. Food preservatives extend the shelf life of certain food products. Preservatives delay degradation caused by microorganisms and therefore maintain the color, texture, and flavor of the food item.

Chemical preservatives can be classified as **natural** and **artificial**. **Animals, plants, and microorganisms** contain **various chemicals** which have potential to preserve foods. They also function as **antioxidants, flavorings, and antibacterial agents**. Different natural reagents with their functions are presented as food preservatives in table 1. **Artificial preservatives** are produced **industrially**. These can be classified as antimicrobial, antioxidant, and antienzymatic.. The classification of artificial preservatives used in food industry is presented in Table 2.

Table 1: Some types of natural preservatives

Natural preservation	Example of food items	Functions
Salt	Salted fish	Salt and sugar draw the water out of microorganisms and related the growth of microorganisms
Sugar	Jam	
Vinegar	Pickled mango	Vinegar provides an acidic condition which creates an un favorable condition for microorganisms
Rosemary extract	Mayonnaise, margarine, oils and fats	Rosemary extracts work as antioxidant

Table 2: Classification of artificial preservatives

	Antimicrobial agents	Antioxidants agents	Antienzymatic agents
Definition	Inhibit the growth of undesirable microorganisms (fungi, bacteria, yeast)	Inhibit atmospheric oxidation. Mainly used for the products that contains unsaturated fatty acids, oils, and lipids	Prevent natural ripening process and oxidative deterioration of food by inhibiting the bacteria, parasite, fungi
Mechanism	Creates unfavorable environment for microorganisms by reducing moisture content and increasing acidity	Oxidation of unsaturated fats produces free radicals which can start chain reactions. In this reaction, aldehyde and ketones are produced which results in the rancid taste of foods. Antioxidants terminate these chain reactions by removing free radical intermediates and inhibit other oxidation reactions	Blocks enzymatic processes in the food that continue to metabolize after harvest. Metal chelating agents can remove the metal cofactors that many enzymes need
Applications	Sorbic acid (2,4-hexadienoic acid) and potassium sorbet for the preservation of cheese, bakery products, vegetable-based products, dried fruits, beverages, and other products as well as smoked fish, margarine, salad cream, and mayonnaises.	Butylated hydroxyl anisole, (BHA) for the preservation of butter, lard, meats, beer, baked goods, snacks, potato chips, nut products, dry mix for beverages	Citric acid for the preservation of foods, beverages, dairy products, and pharmaceuticals
	Benzoic acid and sodium benzoate for the preservation of	Butylated hydroxyl toluene (BHT) in fats and oils processing	EDTA (ethylenediamine tetra acetic acid) in food processing

	mayonnaises, pickled vegetables, fruit preparation and fruit based drinks, dessert sauces and syrups		
	Lactic acid for the preservation of meats	Sulfites for the preservation of beer, wines, dried foods	Polyphosphates for the preservation of fresh peeled fruits and vegetables
	Parabens (esters of para-hydroxy benzoic acid) for the preservation of dried meat products, cereal and potato based snacks and confectionary	Vitamin E for the preservation off fruits and vegetables	Polyphosphates for the preservation of fresh peeled fruits and vegetables
	Nitrite (sodium nitrate) for the preservation of meat	Gallates in fats and oils processing	–
	Sulfur dioxide, sodium sulfite for the preservation of dried fruits, certain fruit juices, potatoes, and wines	Ascorbyl palmitate for the preservation of sausages and chicken broths	–

