



## **To Study The Harmful Effects Of Food Preservatives On Human Health**

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### **ABSTRACT**

Food chemistry is the study of chemical processes and interactions of all biological and non-biological components. Food additives are chemicals added to foods to keep them fresh or to enhance their color, flavor or texture. They may include food colorings, flavor enhancers or a range of preservatives. The chemical added to a particular food for a particular reason during processing or storage which could affect the characteristics of the food, or become part of the food. Preservatives are additives that inhibit the growth of bacteria, yeasts, and molds in foods. Additives and preservatives are used to maintain product consistency and quality, improve or maintain nutritional value, maintain palatability and wholesomeness, provide leavening (yeast), control pH, enhance flavour, or provide colour. 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. Some preservatives are known to be harmful to the human body. Some are classified as carcinogens or cancer causing agents.

**Keywords :** Food , Food additives, colour, flavour , texture, preservatives.

## INTRODUCTUION

Food chemistry is the study of chemical processes and interactions of all biological and non-biological components. Food additives are chemicals added to foods to keep them fresh or to enhance their colour, flavour or texture.<sup>1-2</sup> They may include food colourings, flavour enhancers or a range of preservatives.<sup>3</sup> The growth in the use of food additives has increased enormously in the past 30 years, totalling now over 200,000 tonnes per year.<sup>4-5</sup> Therefore it has been estimated that as today about 75% of the Western diet is made up of various processed foods, each person is now consuming an average 8-10 lbs of food additives per year, with some possibly eating considerably more.<sup>5-7</sup> Nowadays, most people tend to eat the ready-made foods available in the market, rather than preparing them at home. Such foods contain some kind of additives and preservatives, so that their quality and flavour is maintained and they are not spoiled by bacteria and yeasts. More than 3000 additives and preservatives are available in the market, which are used as antioxidants and antimicrobial agents.

### **1.Preservatives in food :**

Preservatives are the compounds used to prevent and retard the microbial spoilage of food. Section 3.1.4 of FSS (Food Product Standards and Food Additives)

Regulations, 2011 defines preservative as "a substance which when added to food is capable of inhibiting, retarding or arresting the process of fermentation, acidification or other decomposition of food." Preservatives aim to prevent the growth of micro-organisms which could cause food spoilage and lead to food poisoning; extend the shelf-life of products, so that they can be distributed and sold to the consumer with a longer shelf-life. Preservatives or antimicrobial agents play an important role in today's supply of safe and stable foods. Increasing demand for convenience foods and reasonably long shelf life of processed foods make the use of chemical food preservatives imperative. Some of the commonly used preservatives such as nitrate, and salt have been used for centuries in processed meats and wine This makes it an effective antimicrobial in high-acid foods, fruit drinks, cider, carbonated beverages, and pickles .It is also used in margarines, salad dressings, soy sauce, and jams. Some of the commonly used food additives and preservatives are aluminium silicate, amino acid compounds, ammonium carbonates, sodium nitrate, white sugar, salt, potassium bromate, potassium sorbate and sodium benzoate.

- 1.1 Food preservatives and their functions:

- To improve or maintain nutritional value of food.
- To enhance quality and to reduce wastage.
- To enhance consumer acceptability and keeping quality to make the food more readily available.
- Preservatives are additives that inhibit the growth of bacteria, yeasts, and molds in foods.
- To facilitate preparation of the food Preservatives or antimicrobial agents play an important role in today's supply of safe and stable foods.
- Increasing demand for convenience foods and reasonably long shelf life of processed foods make the use of chemical food preservatives imperative.
- Some of the commonly used preservatives such as nitrate, and salt – have been used for centuries in processed meats and wine

**1.2: Classification of Preservatives:** preservation is implemented in two modes, chemical and physical. In Chemical preservation [chemical compounds](#) are added to the product. In Physical preservation processes refrigeration or dry are done. Preservative [food additives](#) reduce the risk of [food borne infections](#), decrease microbial spoilage, and preserve fresh attributes and nutritional quality. Some physical techniques for food preservation include dehydration, UV-C radiation, freeze-drying, and refrigeration. Chemical preservation and physical preservation techniques are sometimes combined. They are classified into Class I and Class II preservatives.

Class I preservatives are Common salt ,Sugar ,Dextrose ,Glucose, Spices Vinegar or acetic acid ,Honey ,Edible vegetable oils.

Class II preservatives are Benzoic acid including salts there of Sulphurous acid including salts there of Nitrates or Nitrites of Sodium or Potassium in respect of foods like ham.

Pickled meat ,Sorbic acid and its sodium, potassium and calcium salts ,Propionates of Calcium or sodium, lactic acid and its sodium, potassium and calcium salts and acid calcium phosphate and **Nisin Sodium Benzoate**: it is used in fruit juice, pickles, preserves soft drinks to prevent growth of micro-organisms in acidic foods. **Benzoic Acid** : Preservative: Fruit juice, carbonated drinks, pickles. Manufacturers have used sodium benzoate (and its close relative benzoic acid) for a century to prevent the growth of microorganisms in acidic foods. The substances occur naturally in many plants and animals. allergic reactions in sensitive individuals. **Another problem occurs when sodium benzoate is used in beverages that also contain ascorbic acid (vitamin C). The two substances, in an acidic solution, can react together to form small amounts of benzene, a chemical that causes**

leukemia and other cancers. Though the amounts of benzene that form are small, leading to only a very small risk of cancer, there is no need for consumers to experience any risk. In the early 1990s the FDA had urged companies not to use benzoate in products that also contain ascorbic acid, but in the 2000s companies were still using that combination. A lawsuit filed in 2006 by private attorneys ultimately forced Coca-Cola, Pepsi, and other soft-drink makers in the U.S. to reformulate affected beverages, typically fruit-flavored products<sup>6</sup>. **Sulfur dioxide and sulfites:** It has long been used as preservatives. Serving both as antimicrobial substance and as antioxidant Sulfur dioxide is a gas that can be used in compressed form in cylinders. It is liquid under pressure of 3.4 atm and can be injected directly in liquids. It can also be used to prepare solutions in ice cold water. It dissolves to form sulfurous acid. Sulfurous acid inhibits molds and bacteria and to a lesser extent yeasts. For this reason, SO<sub>2</sub> can be used to control undesirable bacteria and wild yeasts in fermentations without affecting the SO<sub>2</sub>- tolerant cultured yeasts. **Sodium chloride**; Sodium chloride has been used for centuries to prevent spoilage of foods. Fish, meats and vegetables have been preserved with salt. Today, salt is used mainly in combination with other processing methods. The antimicrobial activity of salt is related to its ability to reduce the water activity (a<sub>w</sub>) thereby influencing microbial growth. Salt has the following characteristics:

- It produces an osmotic effect
- It limits oxygen solubility
- It changes pH
- Sodium and chloride ions are toxic
- Salt contributes to loss of magnesium ions
- The use of sodium chloride is self-limiting because of its effect on taste

**Nisin** is an antimicrobial polypeptide produced by some strains of *Lactococcus lactis*

Nisin-like substances are widely produced by lactic acid bacteria. These inhibitory substances are known as bacteriocins. Nisin has been called an antibiotic, but this term is avoided because nisin is not used for therapeutic purposes in humans or animals. Nisin-producing organisms occur naturally in milk. Nisin can be used as a processing aid against gram-positive organisms. Because its effectiveness decreases as the bacterial load increases, it is unlikely to be used to cover unhygienic practices. It contains no aromatic amino acids and is stable to heat. It has been used effectively in preservation of processed cheese. It is also used in the heat treatment of nonacid foods and in extending the shelf life of sterilized milk. **Acids** as food additives serve a dual purpose: acidulants

and preservatives. **Acids:** Food acids are added to make flavors “sharper”, and also act as preservatives and antioxidants. Common food acids include vinegar, citric acid, tartaric acid, malic acid, fumaric acid, and lactic acid.

Nitrates (III) and Nitrates (V) ,Sulphur Dioxide and Sulphates (IV) ,Benzoic Acid and Benzoates; Benzoic acid occurs naturally in many types of berries, plums, prunes, and some spices, As an additive, it is used as benzoic acid or as benzoate.The latter is used more often because benzoic acid is sparsely soluble in water, and sodium benzoate is more soluble. The undissociated form on benzoic acid is the most effective antimicrobial agent pK<sub>a</sub> of 4.2; optimum pH range is from 2.5 to 4.0. Sorbic Acid and Sorbates Sorbic acid is a straight-chain, *trans-trans* unsaturated fatty acid, 2,4-hexadienoic acid .As an acid, it has a low solubility in water at room temp. The salts, sodium, or potassium are more soluble in water.Sorbates are stable in the dry form; the are unstable in aqueous solutions because they decompose through oxidation.The rate of oxidation is increased at low pH, by increased temp, and by light exposure .Sorbic acid and other sorbates are effective against yeasts and molds.Sorbate inhibit yeast growth in a variety of foods including wine, fruit juice, dried fruit, cottage cheese, meat, and fish products.Sorbates are most effective in products of low pH including salad dressings, tomato products, carbonated beverages, and a variety of other foods.The effective level of sorbates in foods is in the range of 0.05 to 0.30 percent Propanoic Acid and Propanoates .Phosphoric acid is used in cola soft drinks to reduce the pH.Acetic acid is used to provide tartness in mayonnaise and salad dressings.Similar functions are served by organic acid.Citric acid, tartaric, malic, lactic acids. Straight chain carboxylic acids, propionic and sorbic acids, are used for their antimicrobial properties.Propionic acid is mainly used for its antifungal properties

**1.3 Harmful Effects of Food Preservatives on Human Health :** The increasing demand for ready-to-eat fresh food products has led to challenges for food distributors regarding the safety and quality of their foods<sup>8-9</sup>. Artificial preservatives meet some of these challenges by preserving freshness for longer periods of time, but these preservatives can cause negative side-effects as well. Sodium nitrite is a preservative used in lunch meats, hams, sausages, hot dogs, and bacon to prevent botulism.<sup>10</sup>It serves the important function of controlling the bacteria that cause botulism, but sodium nitrite can react with proteins, or during cooking at high heats, to form carcinogenic N-nitrosamines<sup>11</sup>. It has also been linked to cancer in lab animals.<sup>[13]</sup> The commonly used sodium benzoate has been found to extend the shelf life of bottled tomato paste to 40 weeks without loss of quality. However, it can form the carcinogen benzene when combined with vitamin C. Many food manufacturers have reformed

their products to eliminate this combination, but a risk still exists.<sup>[14]</sup> Consumption of sodium benzoate may also cause hyperactivity. For over 30 years, there has been a debate about whether or not preservatives and other food additives can cause hyperactivity.

**DISCUSSION AND CONCLUSION:** Preservatives are used to increase the shelf life of food and to maintain the quality for longer time. Synthetic food additives react with the cellular component of the body leading to the various food disturbances (effects). If we must use food additives, because of their advantages, they should be the natural ones which have minimal effects and those that are generally recognized as safe (GRAS) and in the case of those not generally recognized as safe (Non GRAS), the acceptable daily intakes (ADIs) should not be exceeded. To minimize the risk of developing health problems due to food additives and preservatives, one should avoid the foods containing these additives and preservatives. Before purchasing the canned food, its ingredients should be checked. Purchase only organic foods, which are free from artificial additives and preservatives.

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