Determination of the concentration of benzoic acid and sorbic acid in ready to serve products using high performance liquid chromatography (HPLC)

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Abstract

Sodium benzoate and potassium sorbate are two of the most common chemical preservatives used in ready-to-eat foods. A total of 50 commercial brands of heavily consumed, ready-to-serve items were examined in this report. The preservatives were determined by HPLC using a reversed??? Phase C18 column and UV detection at 235nm. Flow rate is around 1.2ml/min. Mix 50 volume parts ammonium acetate solution with 40 volume parts methanol for HPLC eluent and switch with acetic acid to a pH of 4.5 to 4.6. Authentic external standards sodium benzoate and potassium sorbate were used to determine the preservative concentration in samples. The minimum and maximum concentrations of benzoate content in different brands were 80ppm and 874ppm, respectively, and the minimum and maximum concentrations of sorbate were 60ppm and 562ppm, respectively, in 50 samples. Exposure to these chemical preservatives could be harmful to people's health, especially if they're consumed in a variety of foods at the same time.

Preservatives are widely used in meats, cosmetics, and pharmaceutical products as additives. The addition of preservatives prevents the product composition from being altered or degraded [1]. Due to its high solubility, chemical preservatives such as sorbic acid and its sodium, potassium, and calcium salts are commonly used in this form of preservation nowadays. Sorbates are used in a variety of applications, including human food, animal nutrition, pharmaceuticals, cosmetics, and packaging materials. Sorbates are used as a food preservative in dairy and cheese products, yoghurt, and sour cream, among other things.

These compounds are commonly used to prevent the growth of yeast and mould. They're also successful against a wide variety of bacteria. These compounds have the highest activity in foods with a low pH value, whereas they are ineffective in foods with a neutral pH value [6, 7]. Their water solubility varies according to the pH and temperature of the surrounding climate. Solubility of sorbic acid in water decreases as the concentration of soluble food components such as sucrose, glucose, and NaCl rises. Solubility of sorbic acid in water at 25°C is 0.16 percent, but potassium sorbate has a solubility of over 50% under the same conditions. Potassium sorbate is a white crystalline powder with the chemical formula CH3CH = CHCH = CHCOOK. It has a very high solubility in water, with a solubility capacity of 139.2 g per 100 ml. At 20°C, 20 g dissolves in 1 ml of alcohol. In comparison to water, sorbates are more soluble in alcohol. Sorbic acid can be used in a variety of ways in food. It can be sprinkled in powder form, dipped into food-grade sorbate solutions formulated in specific amounts, or coated with sorbate packaging materials, and it can be applied directly to the substance or sprayed onto the surface. Dipping and spraying applications necessitate high-concentration solutions.

Preservatives and other food additives may cause allergic or intolerance reactions. Sorbic acid is considered a healthy and nontoxic preservative, although it can trigger allergies when used in large quantities. One of the potential side effects of potassium sorbate is migraine, a common form of headache. Hyperkalemia is caused by blood potassium levels that are higher than average.

In processed foods, the use of sorbic acid and its salts is important. Failure to use this antimicrobial agent can result in microbial activity and food poisoning. The use of these preservatives, however, has some drawbacks. Because of their role in good eating, prevention, and healing effects, fermented products are the first food group to have food additive restrictions. Turkish Food Codex, which is prepared in compliance with European Union directives and based on scientific truths and conclusions of Codex Alimentarius, is useful in such applications in Turkey.

UV spectroscopy,high-performance liquid chromatography (HPLC), gas chromatography (GC), and LC-MS/MS are some of the methods used to analyse sorbic acids in food. The aim of this research is to use HPLC to determine the concentration of sorbic acid in cheese samples. Because of its superior performance and reliability, HPLC detection has become the most widely used analytical separation technique, especially in the pharmaceutical, environmental, forensic, clinical, food, and flavour sciences.

In Turkey, sorbic acid is commonly used in dairy products. As a result, Turkish public health authorities should control dairy companies' use of sorbic acid.

In this research, a new and quick HPLC method for determining sorbic acid in ten commercial cheese samples was established with high precision and accuracy. The study takes about 3 minutes to complete.

High recovery values mean that the procedure is unaffected by the negative effects of widely used additives in cheese samples. In comparison to literature results, this study has a lower detection limit and higher recovery values.

Biography

H W C Krishanthi Karunarathne has completed her MSc. in Analytical Chemistry, University of Peradeniya. She is the Assistant Government Analyst in the Government Analyst Department. She had published more than 10 papers in reputed journals.

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