Bulletin of Nexus
Multidisciplinary International Research Journal, Double-Blind Peer Reviewed, Open Access Journal
ISSN : 3065-7865 / Volume-2, Issue-2 / February - 2025

Original Article

Detection and Analysis of Sodium Benzoate in Food Samples: A Study on its Presence and Potential Health Impacts

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Manuscript ID: BN-2025-020208

ISSN: 3065-7865

Volume 2

Issue 2

February 2025

Pp. 43-45

Submitted: 26 Dec 2024

Revised: 12 Jan 2025

Accepted: 16 Feb 2025

Published: 28 Feb 2025

DOI: 10.5281/zenodo.15234773

DOI Link: https://doi.org/10.5281/zenodo.15234773

Abstract

The objective of this research is to determine the presence of sodium benzoate in different food samples using a simple detection method with minimal cost. Sodium benzoate is a widely employed food preservative which is capable of extending the shelf life of foods, but can exert potential health risks if ingested in large amounts. The process of detection involved the addition of 0.1 M NaOH to diluted food samples, monitoring the appearance of color or precipitation changes as possible indicators of sodium benzoate. The method's simplicity and low cost make it useful for rapid and accurate assessments of food safety. Out of all samples tested, only the tomato ketchup was able to produce a significant coloras change which indicated the presence of sodium benzoate. The other food samples failed to show any such reaction which suggests that the preservative is not present in those samples. This study illustrates how strong the abovementioned method is in the detection of sodium benzoate suggesting it be incorporated in food quality control mechanisms whose purpose is to ascertain food safety. It also stressed the need to check the concentration of sodium benzoate in processed foods for its possible health hazards associated with its use. These conclusions provide a basis for developing innovative approaches to the economical measurement of food additives, and with the regulation of food additives. This study helps improve public health by ensuring the safe use of processed foods.

Keywords: *Sodium benzoate, preservatives, Tomato ketchup, packaged pickle, soft drink, health impacts.*

Introduction

The study seeks to design and implement a low-cost, simple-to-reproduce method for the determination of sodium benzoate in food samples. Sodium benzoate is a very common food preservative, and its detection will be important in determining safety and regulatory compliance. The test procedure entailed the addition of 0.1 M NaOH to the diluted food samples, and a color change or the formation of a precipitate indicated sodium benzoate. The procedure is simple and inexpensive and uses minimal specialized equipment, so it is ideal for routine quality control tests.Among the food samples tested, tomato ketchup was the only sample that indicated the presence of sodium benzoate by the development of a clear color change or precipitation upon testing. The results validate the effectiveness of the test to detect sodium benzoate with high specificity and reproducibility.

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How to cite this article:

Patil, M., Tajane, A., Verma, B., Nachan, T., Cheripelli, S., Ansari, A., Gavhane, P., Ansari, A., & Patil, S. (2025). Detection and Analysis of Sodium Benzoate in Food Samples: A Study on its Presence and Potential Health Impacts. Bulletin of Nexus, 2(2), 43–45. https://doi.org/10.5281/zenodo.15234773

Quick Response Code:

Website: https://bnir.us

OPEN ACCESS

This research acknowledges the need for pragmatic approaches in identifying food additives to enhance levels of food safety and quality. It also highlights the need for ongoing assessment of the health risk of sodium benzoate to ensure its use in foodstuffs is safe. Through developing a fast and inexpensive testing method, this research facilitates improved monitoring systems within the food industry to provide consumer protection as well as regulatory compliance.

Methodology

In preparing the sample, the beverage or food item was properly diluted using distilled water at a ratio of 1:10 or 1:100 for homogeneity during testing. Thereafter, 1–2 mL of diluted sample was transferred to a fresh clean test tube. The NaOH solution at a concentration of 0.1 M was added slowly in 2–3 drops to the sample. The reaction mixture was then carefully observed for any visible change in color, noting down particularly any darkening of yellow color. The observations were recorded within 5–10 minutes of addition of the NaOH, in order to attain accurate and prompt results.

Result

Sample 1: Packaged Pickle.

Lack of color change in the sample of packaged pickle means that sodium benzoate is not present.

Sample 2: Soft Drink

No color change was observed, which means that there is no sodium benzoate in the soft drink.

Sample 3: Tomato Ketchup

Yellow color deepening means that sodium benzoate is present in the sample.

Blank

Test

Conclusion

This research showed an economical technique for the detection of sodium benzoate in food samples, validating its presence in tomato ketchup. Though it is a useful preservative, the health hazards of sodium benzoate make it necessary to conduct more research to assess its safety in an overall manner. Food companies must look into alternative preservatives with safer reputations, and consumers must stay aware of the possible hazards of sodium benzoate. Safeguarding both public health needs and food preservation requires careful balance and continued study as well as review by the regulations to promote protection of consumers.

Discussion

Sodium benzoate, one of the preservatives commonly applied in acidic foods, is extremely effective against microbial growth, Its safety at high concentrations has been questioned in recent times. Although regulatory agencies like the FDA and EFSA have approved sodium benzoate as safe in defined amounts, studies indicate possible health hazards of excessive intake.Sodium benzoate in high levels has been associated with skin and eye irritation, gastrointestinal symptoms, cardiovascular toxicity, and injury to organs like the liver and kidneys. Animal model research has also indicated its potential to interfere with lethal development, hormonal disruption, and disruption of sexual reproduction. Further, evidence has

indicated its potential to induce DNA damage, fragmentation of chromosomes, and oxidative stress, with potential effects including immune dysfunction, allergy, asthma, and hyperactivity.

In this study, sodium benzoate was detected in tomato ketchup but not in soft drink or packaged pickle samples. While the detection process was efficient and simple to apply, the results raise questions regarding the uniformity of sodium benzoate application across food products.

Acknowledgment

I am Manushree Prasad Patil thankful to Coordinator Miss. Archana Tajane Mam Department of Biotechnology and Microbiology B. N. N. College Bhiwandi for granting permission to carry out the work.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper

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