INNOVARE JOURNAL OF HEALTH SCIENCES

Vol 11, 2023

ISSN - 2347-5536

Research Article

# QUANTIFICATION OF PRESERVATIVES IN PROCESSED FOOD PRODUCTS BY TITRIMETRIC METHOD

**BHAVYA SRI K[1]*, SAILEELA S[2], SHAHEEN BANU[2], MOGILISUMAKANTH[3]**

**[1]Department of Pharmaceutical Analysis, RBVRR Women's College of Pharmacy, Barkatpura, Hyderabad, Telangana, India. [2]Department of Pharmaceutical Analysis, RBVRR Women's College of Pharmacy, Barkatpura, Hyderabad, Telangana, India. [3]Department of Pharmaceutical Chemistry, RBVRR Women's College of Pharmacy, Barkatpura, Hyderabad, India. Email: bhavya.kagga@gmail.com**

***Received: 15 May 2023, Revised and Accepted: 14 August 2023***

**ABSTRACT**

**Objectives:** A preservative is a substance or a chemical that is added to the products, such as food products, beverages, and pharmaceutical drugs. The main objective involved in food preservative-specific additives is added to prevent the growth of microorganisms and spoilage of food. The spoilage of food can be caused by the growth of bacteria which can lead to changes in texture and appearance.

**Methods:** In general, preservation is implemented in two modes chemical and physical. Chemical preservation entails adding chemical compound to the product and physical preservation entails processes such as drying.

**Results:** The preservatives in this article can be determined using the titrimetric method. In this article, the titration was carried out against 0.5 N NaOH, and bromothymol blue is used as an indicator.

**Conclusion:** The proposed method was found to be very easy, simple, and cost-effective.

**Keywords:** Biological samples, Cosmetics, Titrimetric method, Microbial spoilage.

 DOI: http://dx.doi.org/10.22159/ijhs.2023v11i1.IJHS_48322. Journal homepage: https://innovareacademics.in/journals/index.php/ijhs

## INTRODUCTION

Preservatives are the compounds used to prevent microbial spoilage of food and the preservatives are classified into two classes Class-1 [1,2] preservatives are naturally occurring substances such as salt, sugar, dextrose, honey, and edible vegetable oils and the Class-2 preservatives are synthetically derived from chemicals such as benzoic acid and sorbic acid para-hydroxyl benzoate [3]. Hence, their use must be within the tolerance limit set by the regulatory bodies. Benzoic acids such as sodium benzoate are separated from a known quantity of the sample by saturating with sodium chloride and then acidifying with 3% HCL and extracting with chloroform. The chloroform layer is made of mineral acid free and solvent is removed by evaporation [6]. The residue is dissolved in neutral alcohol and the amount of sodium benzoate is determined by titration against standard alkali (Figs. 1-3).

## MATERIALS AND METHODS

### Chemicals

Sodium benzoate, phenolphthalein, sodium chloride, sodium hydroxide, chloroform, ethanol, and hydrochloric acid. Gifted from SDFCL.

### Preparation of sample

#### *Sauces and ketchups*

Add 15 g of salt to 150 g of accurately weighed sample and transfer it into clean and dry volumetric flask rinse with saturated NaCl solution (ml). To this add 15 g of pulverized Nacl (12 g) and then add 10 ml of 10%NaoH solution and make up to the volume with distilled water. Allow it to stand with occasional shaking. Filter and use the filtrate for determination.

#### *Jams and Jellies*

Mix 150 g of sample with 300 ml of saturated NaCl solution. Add 15 g of pulverized NaCl then add 10 ml of 10% NaoH solution and then transfer to 500ml volumetric flask and then dilute to volume with saturated NaCl solution let it stands for 2 h with frequent shaking, filter, and use the filtrate for the determination.

### Beverages and liquid products

Mix the sample thoroughly and transfer 100 g of sample into a 250 ml volumetric flask using saturated NaCl solution. Make alkaline to litmus paper with 10% NaoH solution and make up to the volume with standard NaCl solution. Shake thoroughly and let it stand. Filter the sample and use the filtrate for the determination.

Pipette 100-200 ml of filtrate into 250 ml of clean separating funnel. Neutral to litmus paper using HCL. Add 5 ml excess Hcl. Extract it with chloroform addition by gently shaking occasionally, separate the chloroform layer in a beaker and dry it for evaporation on hot water bath. Dissolve residue in alcohol to neutralize to phenolphthalein indicator and then titrate it add 15 ml of diethyl ether and 25 ml of

**Fig. 1: Jam**

**Table 1: The preservatives of sodium benzoate were determined in various samples [7,8]**

| Serial number | Sample | Weight of the sample (g) | Titer value | Normality of NaOH | Conc.of sodium benzoate obtained (ppm) |
|---|---|---|---|---|---|
| 1 | Sample1-sauce | 10 | 10 | 0.5 | 14,400 |
| 2 | Sample2-sauce | 10 | 12 | 0.5 | 17,280 |
| 3 | Sample-3 | 10 | 15 | 0.5 | 21,600 |
| 4 | Softdrink-sample4 | 10 | 3.1 | 0.5 | 4464 |
| 5 | Softdrink-sample-5 | 10 | 1.8 | 0.5 | 2592 |
| 6 | Energydrink-sample-6 | 10 | 3.9 | 0.5 | 5616 |

**Fig. 2: Soft drinks**


**Fig. 3: Energy drinks**

distilled water. Add bromothymol blue as indicator and titrate it against 0.05 N NaoH. Solution and make up to the volume with standard NaCl solution. Shake thoroughly and let it stand. Filter the sample and use the filtrate for the determination.

### Standard analysis

Weigh accurately about 10 g of sodium benzoate and dissolve in NaoH and Nacl solutions. After standing for some time add 15 ml of diethyl ether 10 ml of ethanol and 25 ml of distilled water and then add few drops of phenolphthalein indicator to neutralize and bromothymol blue as indicator. Titrate it against 0.05 N NaoH (Table 1).

## RESULTS

In the present work, the extraction of samples is done using chloroform by adding the bromothymol blue indicator which is titrated against the 0.05 N NaOH is proved to be a useful approach.

### Calculations

$$\text{Sodium Benzoate}=\frac{144\times\text{Titre}\times\text{Dilution}\times1000\times\text{Normality of NaoH}}{\text{Weight of sample}}$$

144=Molecular weight of sodium benzoate

Titer=Volume of NaOH utilized by the sample

## DISCUSSION

Preservatives are most widely used in marketed food products such as Sauces, energy drinks, and soft drinks. Among all the preservatives, sodium benzoate is most commonly used. There are various quantification methods being performed for the estimation of sodium benzoate in food samples. In this study, different samples were procured from the local market. The extraction procedures were carried out using chloroform then they were quantified using the titrimetric method. Wherein, the titration was carried out against 0.5N NaOH, and bromothymol blue was used as the indicator. By the volume of 0.5 N NaOH consumed, the amount of sodium benzoate present in the marketed sample was calculated. Therefore, the developed method is very easy, simple, and cost-effective.

## CONCLUSION

Food preservatives are an essential constituent of processed foods serving the purpose of extending the shelf life of product. The titrimetric method which is proposed in the above study was found to be simple and economic. The concentration for the sample1 was found to be 14400 ppm. The concentration for the sample 2 was found to be 17280 ppm. The concentration for the sample 3 was found to be 21,600 ppm. The concentration for the sample 4 was found to be 4464 ppm. The concentration for the sample 5 was found to be 2592 ppm. The concentration for the sample 6 was found to be 5616 ppm. Therefore, the titrimetric method is proved to be a useful approach.

## ACKNOWLEDGMENT

I would like to thank our beloved principal, Prof. M. Sumakanth, and faculty pharmaceutical Analysis for giving me this opportunity.

## AUTHORS CONTRIBUTION

All the authors have equally contributed.

## AUTHORS FUNDING

Nil.

## CONFLICTS OF INTEREST

Declared as none.

## REFERENCES

1. Alting AC, van de Velde F. Proteins as clean label ingredients in foods and beverages. In: Natural food Additives, Ingredients and Flavourings. United Kingdom: Woodhead Publishing; 2012. p. 197-211.
2. Marshall DL, Dickson JS, Nguyen NH. Ensuring food safety in insect based foods: Mitigating microbiological and other foodborne hazards. In: Insects as Sustainable Food Ingredients. United States: Academic Press; 2016. p. 223-53.
3. Adrogué HJ, Madias NE. Sodium and potassium in the pathogenesis of hypertension. N Engl J Med 2007;356:1966-78.
4. Alderman MH. Evidence relating dietary sodium to cardiovascular disease. J Am Coll Nutr 2006;25 3 Suppl:256S-61S.
5. Askar A, El-Samahy SK, Shehata HA, Tawfik M. Pasterma and beef bouillon: The effect of substituting KCl and K-lactate for sodium chloride. Fleischwirtschaft 1993;73:289-92.
6. Riddervold A. High Pressure Food Preservation. In: Food Conservation: Papers given to the International Conference on Ethnological; 2008. p. 12-6.
7. Kamel BS, Kakuda Y. Fatty acids in fruits and fruit products. In: Fatty Acids in Foods and their Health Implications. Boca Raton: CRC Press; 2007. p. 277-316.
8. Anand SP, Sati N. Artificial preservatives and their harmful effects: Looking toward nature for safer alternatives. Int J Pharm Sci Res

2013;4:2496-501.
9. Williams GM, Iatropoulos MJ, Whysner J. Safety assessment of butylated hydroxyanisole and butylated hydroxytoluene as antioxidant food additives. Food Chem Toxicol 1999;37:1027-38.
10. Saulo AA. Sugars and Sweeteners in Foods. Hawaii: University of Hawaii; ???.
11. Kinderlerer JL, Hatton PV. Fungal metabolites of sorbic acid. Food Addit Contam 1990;7:657-69.
12. Daniel M. Reactions to food additives and preservatives. Int J Chem Biochem Sci 2007;1:36-47.