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Estimation of sodium benzoate in locally available brands of tomato ketchups using validated UV spectrophotometric method

R Swetha SRI[1*], D Shivani[2], M Sumankanth[3]

[1] Assistant Professor, Department of Pharmaceutical Analysis, RBVRR Women's College Of Pharmacy, Barkatpura, Hyderabad, Telangana, India

[2] Student, Pharmacy Final Year, RBVRR Women's College Of Pharmacy, Barkatpura, Hyderabad, Telangana, India.

[3] Professor and Head of the Institution, RBVRR Women's College Of Pharmacy, Barkatpura, Hyderabad, Telangana, India

Abstract

Commercial samples of tomato ketchups of locally available brands were studied using UV spectrophotometry to find out preservative content. Sodium benzoate is the common preservative present in ketchups. Less toxicity factor makes sodium benzoate fit to be used in food industry as preservative. Different food products like fruit juices, carbonated drinks, bevarages, milk, sauces, jams, jellies, cheese, ketchups contain sodium benzoate as preservative. Extraction with diethyl ether was employed for determination. UV detection was performed at 272nm.The sodium benzoate content Was found to be 354ppm in kissan tomato ketchup,306.8ppm in maggi ketchup, 283.2ppm in patanjali, 377.6ppm in chings tomato ketchup. The present study revealed that the level of sodium benzoate was within the FDA standard range (not more than 750ppm).

Keywords: sodium benzoate, ketchups, UV spectrophotometry, validation, extraction

Introduction

Food Additive means any substance not normally consumed as a food by itself and not normally used as a typical ingredient of the food ,whether or not it has nutritive value, the intentional addition of which to food for a technological purpose like packing. Food additives are used for the purpose of maintaining or improving the keeping quality, texture, consistency, appearance. Some of the examples include colorants, Preservatives, acidity regulators, artificial sweetener and antioxidants. Preservatives are the compounds used to prevent and retard the microbial spoilage. Preservative is defined 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". They are classified into Class I (Common salt, Sugar, dextrose, glucose, spices, acetic acid and honey) and Class II preservatives (Benzoic acid including salts thereof, Sulphurous acid including salts thereof, Nitrates or Nitrites, Sorbic acid and its sodium, Potassium and calcium salts, Methyl or Propyl parahydroxy Benzoate, Sodium diacetate).Ketchup is a thick, cold condiment usually made from tomatoes, that is sold in bottles, sachets etc, kissan tomato ketchup, maggi pichkoo, patanjali tomato ketchup, chings tomato ketchup contain sodium benzoate as preservative. Present study aimed at procuring locally available brands of ketchups for analyzing the sodium benzoate (Figure 1) content by developing a new UV spectrophotometric method.

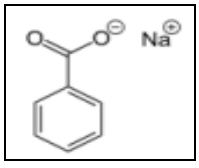

Fig 1: Chemical structure of Sodium benzoate

Materials and Methods

Instrument

A double beam UV-spectrophotometer(ELICO SL-210 consisting of two matched quartz cells with 1cm, spectra treats software used for recording and measuring spectra and absorbance, Electronic analytical weighing balance (Make: CONTECH) and a sonicator.

Chemicals and Reagents

Analytically pure form of sodium benzoate, diethyl ether, hydrochloric acid, sodium chloride were obtained from SD fine chemicals, Mumbai, India. Ammonia was obtained from FINAR chemicals. Marketed ketchups (SULISENT®) were procured from local market with label claim 100mg.

Selection of Analytical Wavelength and Preparation of standard curve

Preparation of stock solution: An accurately weighed 50mg of benzoic acid was transferred into 50ml volumetric flask, added ether to dissolve it and made up the final volume with ether (1000 ppm). 5ml of stock solution was taken in 50ml volumetric flask and made up to mark with ether (100ppm) (Stock I). From stock I, 5ml was taken in 10ml volumetric flask and made up to mark with ether (50ppm), which was scanned in the range of 265-280nm and showed maximum absorbance at 272nm (Figure 2). From stock solution, appropriate dilutions were made to obtain the final concentration of 20,40,60,80,100,120 ppm and absorbance was determined at 272nm. Calibration curve was plotted by taking concentration on X-axis and absorbance at Y-axis (Figure 3).

Sample preparation

10gms of each of the ketchup was transferred into individual separators and diluted to 200ml with saturated sodium

chloride solution. The solution was made definitely acidic to litmus with Hcl. Mixedwell.

Determination by extraction of sodium benzoate

The prepared solution was extracted with each 70, 50, 40, 30 ml portions of diethyl ether, shaked well to ensure complete extraction. Aqueous phase was drained and discarded. The combined ether extracts were washed with 40 and 30ml portions of Hcl. The ether solution was extracted with 50, 40, 30, 20 ml portions of ammonium hydroxide, ether layer was discarded. Combined ammonium hydroxide extract was neutralised with hydrochloric acid and 1ml in excess was added. Acidified solution was extracted with 70, 50, 40, 30 ml of ether. The combined ether extract was diluted to100ml with ether.

Method validation

Precision

The precision of an analytical procedure represents the nearness of agreement between a series of measurements got from multiple sampling of same sample under similar conditions. Precision was carried out by measuring response for a single concentration 20 ppm at 272 nm for 6 replicates.[Acceptance criteria:%RSD<2%].

Linearity

Linearity is a measure of how well a calibration plot of response vs concentration approximates a straight line. Absorbance was measured at 272nm for 20, 40, 60, 80, 100, 120ppm Concentrations.

Robustness

Table 1

Wavelength	Absorbance
265	1.122
266	1.118
267	1.105
268	1.095
269	1.110
270	1.139
271	1.140
272	1.184
273	1.126
274	1.031
275	0.942
276	0.887
277	0.884
278	0.910
279	0.946
280	0.923

It is the reliability of an analysis with respect to deliberate variations in method Parameters. It was determined by performing the same proposed method on different wavelengths, which indicates that the method developed is robust. Absorbance for 20, 40, 60, 80, 100, 120ppm concentrations was measured at 271nm and 273nm. [Acceptance criteria: %RSD<2%].

Results and Discussion

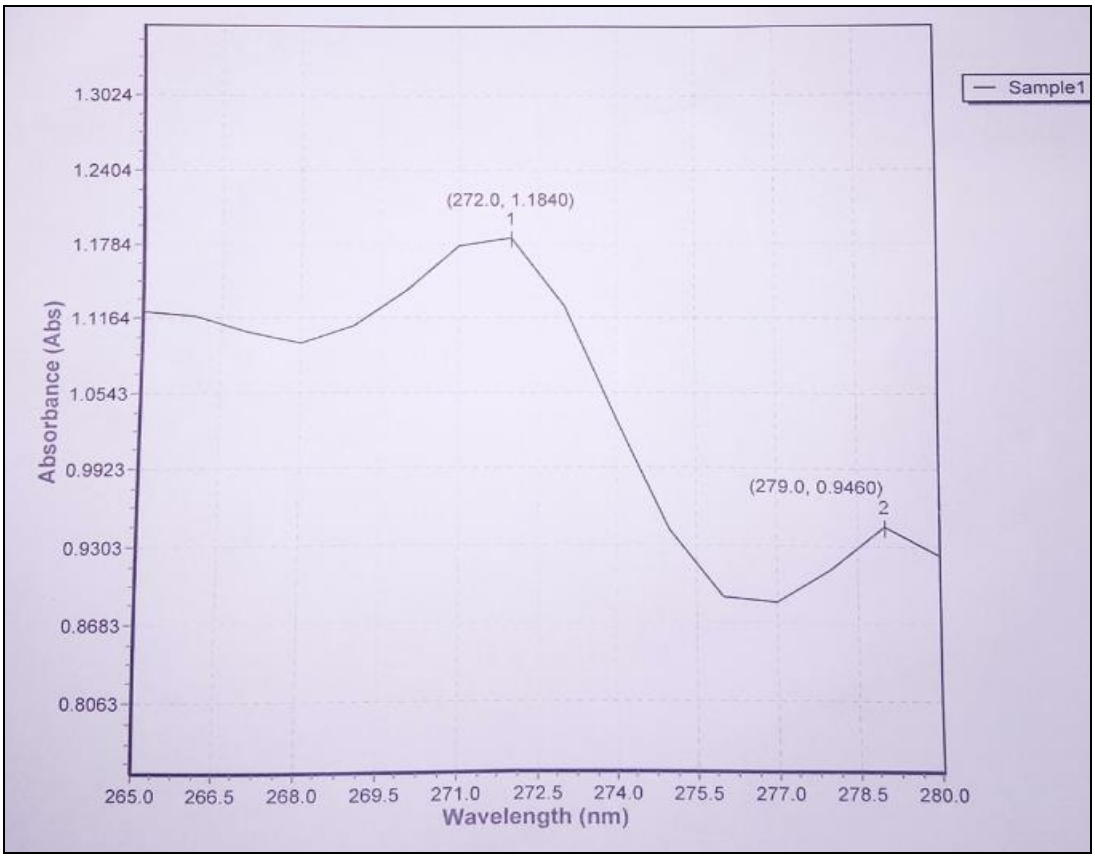

Fig 1

Precision

Table 2

Concentration[ppm]	Interday	Intraday
20	0.337	0.339
20	0.336	0.336
20	0.334	0.337
20	0.331	0.335
20	0.332	0.332
20	0.330	0.333
Mean	0.333	0.335
Std.deviation	0.0025	0.0023
%RSD	0.75%	0.68%

Linearity

Table 3

Concentration[ppm]	Absorbance
20	0.337
40	0.675
60	1.024
80	1.364
100	1.703
120	1.852

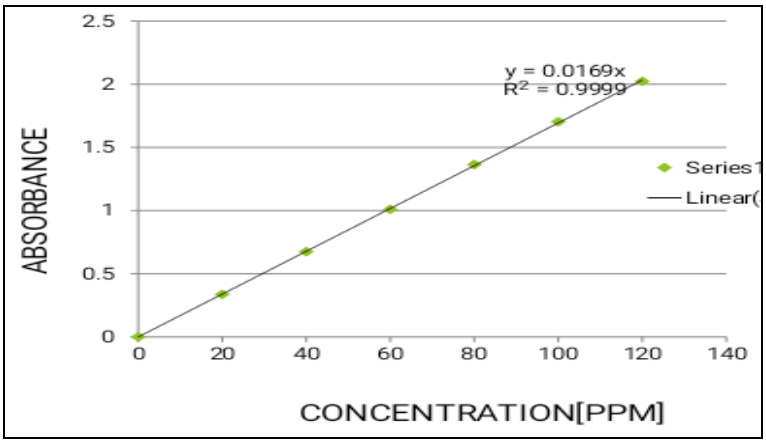

Fig 2

Robustness

Table 4

Concentration[ppm]	271nm	273nm
20	0.339	0.335
20	0.339	0.334
20	0.338	0.332
20	0.336	0.335
20	0.337	0.333
20	0.335	0.331
Mean	0.337	0.333
Std. deviation	0.0014	0.0014
%RSD	0.415%	0.420%

Content of sodium benzoate

Table 5

S. No	Tomato ketchup	Absorbance	Concentration [ppm]	Benzoic acid*1.18=Sodium benzoate
1	Kissan tomato ketchup	0.582	300	354.0 ppm
2	Maggi tomato Ketchup	0.504	260	306.8 ppm
3	Patanjali tomato ketchup	0.463	240	283.2 ppm
4	Chings tomato ketchup	0.599	320	37.76 ppm

Conclusion

UV spectrophotometric method was developed for estimation of sodium benzoate. The detection was done at wavelength of 272nm using diethyl ether as a solvent. The method was validated for linearity, precision, robustness. Sodium benzoate from four tomato ketchups was extracted. The amount of sodium benzoate present in them was calculated.

Analysis of all these ketchups by UV method shows the amount of sodium benzoate in the sample were within the limit.[not more than 750ppm].

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References

1. Balachandran Sreedharan. Estimation of sodium benzoate in ayurvedic formulation: Kashaya (Water decoction), Asian journal of chemistry,2007:19(5):3421-3426.
2. Bahruddin Saad, Md. Fazlul Baria Bahruddin Saad. Simultaneous determination of preservatives (benzoic acid, sorbic acid, methylparaben and propyl paraben) in foodstuffs using high-performance liquid chromatography. Journal of Chromatography A,2005:1073(1-2):393-7.
3. Harry M, Maureen T. Grether-Rapid HPLC method for the analysis of sodium benzoate and potassium sorbate in foods, Journal of chromatography A,2000:1:299-304.
4. Vilas Khade, Sunil Mirgane-High performance liquid chromatography method for the analysis of sodium benzoate, International journal of scientific and engineering research,2014:5(10):2229-5518.
5. Shamoli Akther, Abu zubair. Rashid-Identification and quantification of sodium benzoate in different brands of mango juices available in Tangail region-Bangladesh pharmaceutical journal, 2017, 20(1).
6. Antakli S, Alahmad A. Simultaneous Determination of Sodium Benzoate and Potassium Sorbate Preservatives in Foodstuffs Using High Performance Liquid Chromatography. Asian J Chem,2010:22(4):3275-3282.
7. Khosrokhavar R, Sadeghzadeh N. Simultaneous Determination of Preservatives (Sodium Benzoate and Potassium Sorbate) in Soft Drinks and Herbal Extracts Using High-Performance Liquid Chromatography (HPLC). J Med. Plants, 2010, 9(35).
8. Tidke KJ, Solanki Pr. Estimation of preservative from local market beverages of Amravati (M.S.) by HPLC technique. IJRPC,2014:4(4):1018-1022.
9. Manual of methods of analysis of food by fssai, Ministry of health and family welfare, Government of India, New Delhi, 2016.
10. Zahra Esfandiari, Maryam mirlohi-simultaneous determination of sodium benzoate, potassium sorbate in Iranian yoghurt drink, Iranian journal of public health,2013:42(8):915-920.