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Quantitative Estimation and Comparative Study of Sodium Benzoate in Local Tomato Sauce by UV Spectrophotometric Method

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Abstract
Samples of tomato Sauces of local brads available commercially, were studied using UV spectrophotometric method to find out preservative content in those samples. Sodium benzoate is the common preservative used in sauces. 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 used for quantitative estimation of sodium benzoate. UV spectrophotometry was performed at 272nm wavelength. The sodium benzoate content was found to be 363ppm in kissan tomato ketchup,305ppm in maggi ketchup and 285ppm in patanjali tomato ketchup. The present study revealed that the level of sodium benzoate was within the FDA standard range (Less than equals to 750ppm).

Keywords: S*odium Benzoate, Tomato Sauces, UV spectrophotometry, Extraction, Quantitative Estimation*

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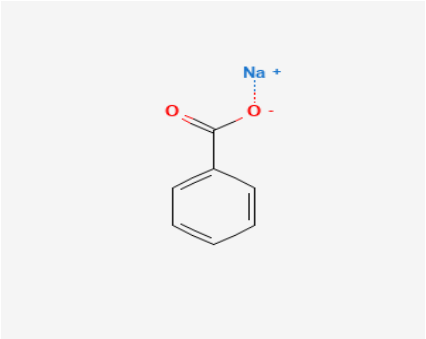
I. Introduction

Additive of food 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.



Sodium Benzoate (NaCH5COO)

II. Aims and Objectives:

To estimate and to study sodium benzoate comparatively in local tomato sauces by UV Spectrophotometric Method

III. Materials and methods

60 samples of tomato sauce (20 of each brand) were collected from the local markets and studied using

a double beam UV spectrophotometer (ELICO SL210) to measure spectra and absorbance.

PROCEDURE

Equipment:

- UV spectrophotometer (ELICO SL210)
- Electronic Weighing Balance (iScalei-06) and
- A Sonicator

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 weighing balance (iScalei-06) 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. Mixed well.

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 to100 ml 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

Table1

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%].

IV. Results

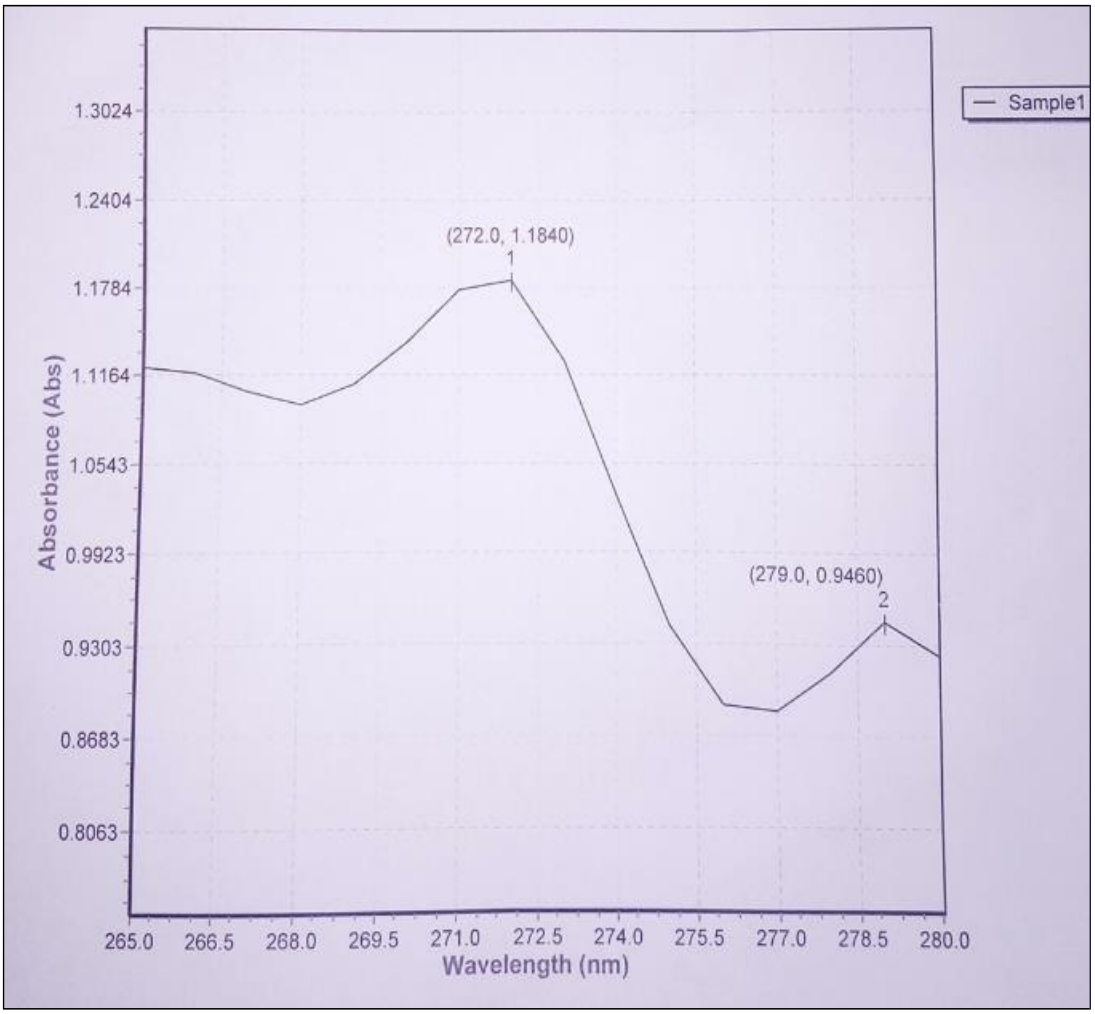


Fig1

Precision

Table2

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

Table3

Concentration[ppm]	Absorbance
20	0.337
40	0.675

60	1.024
80	1.364
100	1.703
120	1.852

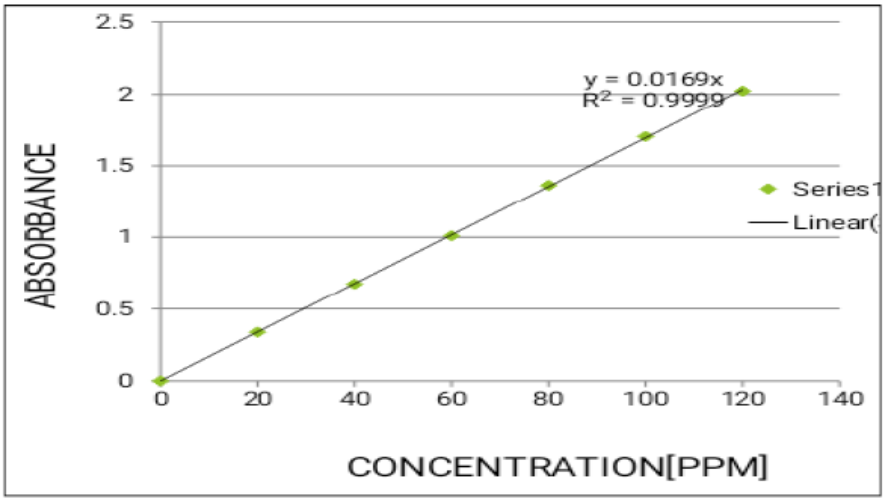


Fig2

Robustness

Table4

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

Table5

S.No	TomatoSauces	Absorbance	Concentration [ppm]	Benzoicacid*1.18=Sodiumbenzoate
1	Kissantomatoketchup	0.582	300	363ppm
2	MaggitomatoKetchup	0.504	260	305ppm

3	Patanjalitomato ketchup	0.463	240	285ppm

V. Discussion

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

VI. Conclusion

Spectra and absorption nalysis of the samples oftomato sauces by UV spectrophotomeric method shows theamount of sodium benzoate in the sample were within thelimit(Less than equals to750ppm).

7. Acknowledgement

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