

# Determination and Estimation of Preservatives in Packaged Food: Know Your Food Substitute Before Consumption

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## Abstract

Food additives are natural or synthetic substances that can be added to foodstuff in small amounts to perform technological functions, namely colour, sweetness or to extend shelf life. Here we are doing some experiments to know which and how much amount of preservatives are present in some chosen packaged food. Here we are taking Tomato ketchup and source, fruit jam and jelly, and beverages like Apple juice and orange soda.

**Preservatives:** Preservatives are the compounds used to prevent and retard the microbial spoilage of food. Section 3.1.4 of FSS (Food Product Standards and Food Additives) Regulations, 2011 Defines preservative 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 and Class II preservatives.

Class I preservatives are

- a) Common salt
- b) Sugar
- c) Dextrose
- d) Glucose
- e) Spices
- f) Vinegar or acetic acid

Addition of class I Preservative in any food is not restricted.

Class II preservatives are

- a) Benzoic acid including salts thereof.
- b) Sulphurous acid including salts thereof.
- c) Nitrates or Nitrites and/or Sodium and Potassium in respect of foods like ham, Pickled meat
- d) Sorbic acid and its sodium,
- e) Potassium and calcium salts
- f) Propionates of Calcium or sodium,
- g) Sodium, Potassium and Calcium salts of Lactic acid.
- h) Nisin
- i) Methyl or Propyl parahydroxy Benzoates
- j) Sodium Diacetate Determination of Benzoic Acid in chosen samples (Figure 1).



**Figure 1:**

## Introduction

Benzoic acid is the second most common preservative added to fruit and vegetable products. Being insoluble in water, it is added as the soluble sodium benzoate. The method commonly followed for the estimation of benzoic acid involves conversion of the salt into benzoic acid by acidification, extraction into an organic solvent and titrating against alkali. Objectives After studying and performing this experiment, you should be able to determine the benzoic acid content of foods by the extraction and alkali titration method.

## Qualitative methods

**Ferric chloride test:** Acidify the food product with hydrochloric acid (1+3) and extract with diethyl ether. Evaporate the solvent on a hot water bath removing last traces of solvent under a current of air. Dissolve the residue in few ml of hot water and add few drops of 0.5% ferric chloride solution. Salmon colour precipitate of ferric benzoate indicates the presence of benzoic acid.

**Result:** All sample showed salmon colour precipitate, so all sample contained benzoic acid (211).

Estimation of preservatives in chosen samples.

## Quantitative methods

**Titrimetric method:** Principle: Benzoic acid is separated from a known quantity of the sample by saturating with sodium chloride and then acidifying with dilute hydrochloric acid and extracting with chloroform. The chloroform layer is made mineral acid free, and the solvent is removed by evaporation. The residue is dissolved in neutral alcohol and the amount of benzoic acid is determined by titration against standard alkali.

### Reagents

- Chloroform-distilled
- Hydrochloric acid (1+3)
- Sodium hydroxide (10%)

- Standard sodium hydroxide solution (0.05N)
- Saturated sodium chloride solution

### Preparation of Sample

**Beverages and liquid products:** Mix the sample thoroughly and transfer 100gm of the sample into a 250ml volumetric flask, using saturated sodium chloride solution. Make alkaline to litmus paper with 10% sodium hydroxide solution and make up to volume with saturated sodium chloride solution. Shake thoroughly and let it stand for 2hrs. Filter the sample and use the filtrate for determination.

**Sauces and ketchups:** Add 15gm salt to 150gm of weighed sample and transfer into volumetric flask. Rinse with saturated sodium chloride solution, add 15gm pulverized sodium chloride and then add 10ml of 10% sodium hydroxide solution and make up to 500ml volume with sodium chloride solution. Let it stand for 2hrs with occasional shaking. Filter and use the filtrate for determination.

**Jams, jellies, preservatives and marmalades:** Mix 150gm of sample with 300ml saturated sodium chloride solution. Add 15gm pulverized sodium chloride. Add 10ml of 10% sodium hydroxide solution. Transfer to 500ml volumetric flask and dilute to volume with saturated sodium chloride solution. Let it stand for 2hrs with frequent shaking, filter and use the filtrate for determination.

**Determination:** Pipette 100ml to 200ml of the filtrate into a 250ml separatory funnel. Neutralize to litmus paper using hydrochloric acid (1+3) and add 5ml excess. Extract carefully with 40,30,30 and 20ml portions of chloroform. Avoid formation of emulsion by shaking gently with rotatory motion. If emulsion forms, break it by stirring chloroform solution with a glass rod after each extraction, but do not drain any of the emulsion with chloroform layer. Transfer the combined chloroform extract into a separatory funnel and wash it free from mineral acid by shaking gently and

rinsing with water. Drain off the water Phase. Dry the chloroform layer over anhydrous sodium sulphate and distil off the solvent. Remove the last traces of the solvent under a current of air at room temperature. Dry the Residue overnight or until no residue of acetic acid is detected if the product is a ketchup. Dissolve residue in 30-50ml of alcohol neutralized to phenolphthalein and titrate with 0.05N sodium hydroxide.

### Calculation/Result

Calculate the benzoic acid contents as follows:

#### Benzoic acid (ppm)

$122 \times \text{Titre} \times \text{Dilution} \times 1000 \times \text{ml of 0.05N sodium Hydroxide} / \text{Weight of sample} \times \text{aliquot taken (100 or 200ml of Filtrate)}$  (Table 1) [1].

**Table 1:** Calculate the benzoic acid contents.

	Estimation of Benzoic Acid	Benzoic Acid (ppm)	Benzoic Acid (gm/100ml)
Sample 1	Kissan jam	10,167.67	1.67
Sample 2	Just Jelly toffee	8540	0.8539
Sample 3	Kissan Tomato ketchup	12,200	1.219
Sample 4	Meggie Tomato sauce	10,167	1.0167
Sample 5	Apple juice	7320	0.739
Sample 6	Orange soda	8540	0.8539

### References

1. AOAC (2000) Official method 963.19. Benzoic acid in foods titrimetric method. (17<sup>th</sup> edn), AOAC International, Maryland, USA.

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