

Determination of Sodium Content in Food Samples

Foods contain varying amounts of salt (NaCl), which has 40% sodium. Determining the sodium content in foods accurately reduces the health risks associated with it. The American Heart Association¹ recommends consumption of less than 1500 mg/day sodium for most American adults, which is the level with the greatest effect on blood pressure.



Introduction

Most foods have sodium from dissolved salts, either naturally present or added in cooking or processing. Table salt known as sodium chloride (NaCl) is the most common source of sodium. It is made up of 40% sodium and 60% chloride and often used in processed and packaged foods as flavour enhancer or preservative. Other sources of sodium added in foods are monosodium glutamate (MSG), sodium nitrite, sodium saccharin,

baking soda (sodium bicarbonate), and sodium benzoate.

The sodium content of food has implications on our health. Sodium is an essential mineral required in small amount by the body to control blood pressure and help the nerves and muscles to function properly. However, high sodium intake can cause health problems such as high blood pressure and cardiovascular diseases, which include heart, stroke, and blood vessel disease. Thus, knowing the sodium content in food and controlling the intake are of utmost important to keep diseases at bay.

Method

Meter Set-Up and Calibration

Make sure that the meter is set to two (2) calibration points prior to calibration. Calibrate the meter according to manufacturer's instructions using 150ppm and 2000ppm sodium ion standards.

Sample Preparation and Measurement

Liquid samples such as soups, sauces, brines, beverages, etc., can be placed directly onto the sensor. Dilute the sample with distilled or deionized water, if the results exceeded the meter's calibration or measurement range (e.g., 5ml sample dilute to 100ml using DI water).

Solid samples such as chips, cheese, ham etc., must be prepared to liberate the sodium. Mince or crush the sample in a blender. Weigh the crushed sample accurately, then add distilled or deionized water (e.g., 5 grams of sample in 100ml DI water). Mix the sample thoroughly. Place some drops of prepared sample onto

Table 1: Range of Sodium Content for Selected Foods

Food Group	Serving Size	Range (mg)
Breads, all types	1 oz	95-210
Frozen pizza, plain, cheese	4 oz	450-1200
Salad dressing, regular fat, all types	2 tbsp	110-505
Salsa	2 tbsp	150-240
Soup (tomato), reconstituted	8 oz	700-1260
Tomato juice	8 oz	340-1040
Potato chips	1 oz	120-180
Tortilla chips	1 oz	105-160
Pretzels	1 oz	290-560

1 oz = 28.4g

(Source: [Dietary Guidelines for Americans - http://health.gov/dietaryguidelines/dga2005/document/html/chapter8.htm](http://health.gov/dietaryguidelines/dga2005/document/html/chapter8.htm))

To determine the sodium content in food samples, LAQUAtwin B-722 Sodium Ion meter offers rapid, simple, and easy measurement. This pocket meter has flat sodium sensor, which measures the sodium concentration in micro-volume samples, and result compensation setting (i.e., multiplication/known factor), which can be used to account sample preparation (e.g., dilution, blank reading) in results. Results can be expressed as parts per million (ppm) or mg/L.

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the sensor and record the reading. To obtain accurate results, a uniform temperature should be maintained for the standard solutions and samples.

After measurement, clean the sensor with detergent and water (warm, if measured sample is oily). If the sensor is stained with sample residues, place a few drops of bleach onto the sensor and leave for 5 to 30 mins. Rinse the sensor with water and blot dry with soft tissue. Condition the sensor by soaking it with 2000ppm sodium standard for 10 minutes to 1 hour prior to next use.

For high accuracy measurement, prepare ionic strength adjuster (ISA) solution containing 4M NH₄Cl and 4M NH₄OH. Add equal volume of ISA to all samples and standards (i.e., 2ml ISA in 100ml samples or standards)².

Table 2: Sodium and Salt Contents Computation

Content Per Serving	Liquid	Solid
Sodium (mg)	Sodium (mg/L or ppm) x sample volume (L)	Sodium (mg/L or ppm) x DI water volume (L) x original sample weight (g) / analyzed sample weight (g)
NaCl (mg)	Sodium (mg) x 2.54	Sodium (mg) x 2.54
Example	Sample: 150mL Tomato Juice 1) Drops of tomato sauce give 1500 ppm reading. 2) 5ml juice diluted to 100ml gives 75 ppm (x 20 to account dilution). For 1 and 2, the sodium content is 225 mg while the salt content is 571.5 mg.	Sample: 28.4g Potato Chips Crush chips and weigh 5g. Add the 5g in 100ml DI water and mix thoroughly. Drops of diluted chips give 250 ppm reading. The sodium content is 142 mg while the salt content is 360.68 mg.

The American Heart Association¹ recommends consumption of less than 1,500 mg per day sodium for most American adults, which is the level with the greatest effect on blood pressure. This level does not apply to people who lose large amounts of sodium in sweat, such as competitive athletes, workers exposed to extreme heat stress, or to those directed otherwise by their healthcare provider.

To achieve the recommended level, check the nutrition information panel on food packaging when shopping and purchase the product which has the lowest sodium content after comparing different brands. Alternatively, test your food samples to determine the sodium content.



Nutrition Facts	
Serving Size 1 can (165 mL)	
Amount per serving	
Calories 30 Calories from Fat 0	
Total Fat 0g	0%
Saturated Fat 0g	0%
Cholesterol 0mg	0%
Sodium 520mg	22%
Total Carbohydrate 6g	2%
Dietary Fiber 1g	4%
Sugars 5g	
Protein 1g	

Figure 1: Nutrition Facts on the label of Tomato Juice (Source: Sodium Content, Medline Plus <https://www.nlm.nih.gov/medlineplus/ency/imagepages/19703.htm>)

References And Suggested Readings

1. American Heart Association. Frequently Asked Questions about Sodium. www.heart.org
2. Nielsen, Suzanne. Sodium Determination Using Ion Selective Electrodes, Mohr Titration, and Test Strips. Chapter 10. Food Analysis Laboratory Manual. 2nd Edition. USA: Springer. 2015

B-722 Sodium Ion Meter

B-722 Sodium Ion Na⁺



Features

Pocket meter with flat sodium sensor capable of measuring sodium concentration in micro-volume samples and programmed with result compensation setting (i.e., multiplication/known factor) for easy, quick, and direct measurement.

Applications include

Food Processing and Quality Control, Health Management, Salt Water Testing, etc.



LAQUAtwin Pocket Ion Meter Lineup



pH
Acidity and alkalinity

COND
Conductivity and TDS

Na+
Sodium Ion

K+
Potassium Ion

NO₃⁻
Nitrate Ion

Ca²⁺
Calcium Ion

Salt EC
Salt (NaCl)



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