Does "Salt Sense" Make Sense?

Measurement Lab Activities

Introduction

Does Salt Sense® Make Sense? There are several salt products in the market that claim to contain less sodium. How is this possible? If it is possible, is it worth using? Determining the density of two types of salt—regular table salt (store brand) and Salt Sense.

Concepts

- Food additives
- Nutritional benefits
- Consumer chemistry

Materials

Iodized table salt, 50 g

Salt Sense, 30 g

Balance, centigram

Graduated cylinder, 50-mL, 2

Hand magnifier

Safety Precautions

The materials used in this laboratory demonstration are considered nonhazardous. Once food items enter the lab, they are considered chemicals and should be used for laboratory purposes only. Wash hands thoroughly with soap and water before leaving the laboratory. Follow all laboratory safety guidelines.

Procedure

1. Label graduated cylinders 1 and 2. Place one of the graduated cylinders on the balance. Measure the mass and instruct students to record to 2 decimal places.
2. Pour regular table salt into the graduated cylinder to the 15-mL mark. Measure the mass of the cylinder containing 15 mL of table salt and record to 2 decimal places.
3. Pour additional table salt into the cylinder to the 35-mL mark. Measure the mass of the cylinder containing 35 mL of salt and record to 2 decimal places.
4. Pour additional salt into the cylinder to the 50-mL mark. Measure the mass of the cylinder containing 50 mL of salt and record to 2 decimal places.
5. Repeat steps 1–4 for Salt Sense. Record measurements as before.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures governing the disposal of laboratory waste. All chemicals used in this demonstration may be disposed of in the regular trash according to Flinn Suggested Disposal Method #26a.

Tip

- Salt Sense is not a salt substitute; it is table salt that has been processed to yield 33% less sodium by volume.

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Discussion

When salt crystals are grown by rapid evaporation of a brine solution (Alberger process), the crystals have a step-like structure resembling a series of hollow rectangles called "hopper salt." When subjected to stress, the rectangles break giving flake salt. The difference between flake salt and ordinary granulated salt crystals can be seen with a hand lens. The claim of Salt Sense—33% less sodium per teaspoon—is due to the lower density of the flake salt!

Data Table

Mass of cylinder _____

Volume of Salt	Mass of Salt + Cylinder	Mass of Salt Sense + Cylinder
15.0 mL		
35.0 mL		
50.0 mL		

Calculations

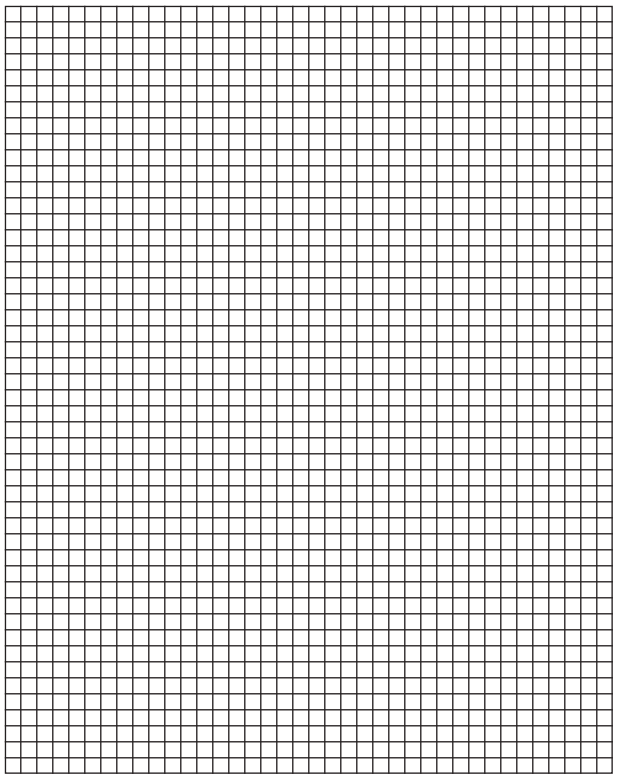
1. Determine the mass of each sample of salt by subtraction and record in the table below to 2 decimal places.

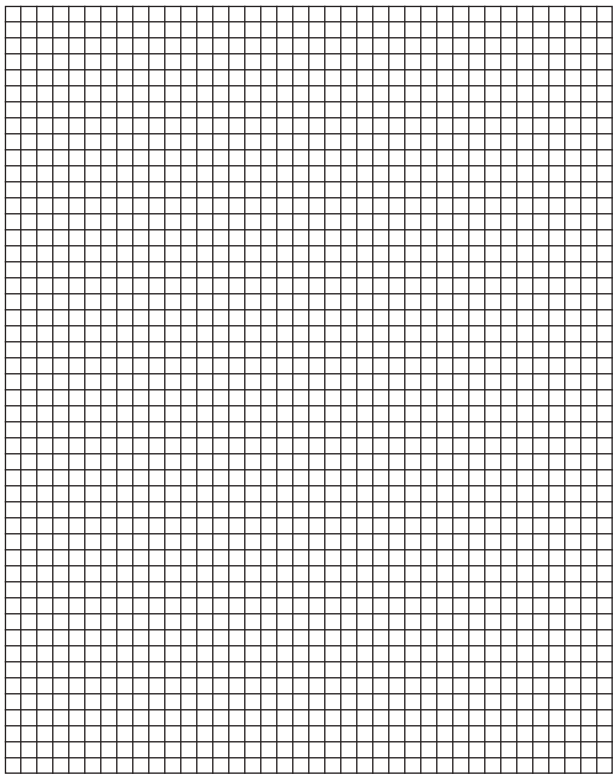
Volume of Salt	Mass of Salt	Mass of Salt Sense
0.0 mL	0.00 g	0.00 g
15.0 mL		
35.0 mL		
50.0 mL		

Graphing Activity — Salt Sense

2. Using the grid below prepare a graph of volume (on the *x*-axis) and mass (on the *y*-axis) for the salt and for the Salt Sense—following these directions:

(1) Title the graph; (2) Label the axes, including units; (3) Label the origin, 0,0; (4) Choose a spacing on the graph to use as much of the grid as possible; (5) Using a ruler, draw the best straight line through the plotted points.





3. Determine the density of each sample from the slope of the straight-line graph. Express to 3 significant figures and express in appropriate units.

salt = _____ Salt Sense = _____

4. Place a few crystals of regular salt in a Petri dish. Obtain a hand magnifier from the teacher and examine the crystals of the salt. *Note:* You may wish to use the magnifier in the handle. Make a large-scale sketch of one salt crystal. Repeat with a sample of Salt Sense.

salt Salt Sense

5. Salt Sense claims to have 33% less sodium per teaspoon. Explain how this is possible based on the shape of the crystals.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12

Evidence, models, and explanation
Constancy, change, and measurement
Form and function

Content Standards: Grades 5–8

Content Standard A: Science as Inquiry
Content Standard B: Physical Science, properties and changes of properties in matter, motions and forces, transfer of energy
Content Standard F: Science in Personal and Social Perspectives, personal health; populations, resources, and environments; natural hazards, risks and benefits, science and technology in society

Content Standards: Grades 9–12

Content Standard B: Physical Science, structure of atoms, structure and properties of matter, chemical reactions, motions and forces, conservation of energy and increase in disorder, interactions of energy and matter
Content Standard F: Science in Personal and Social Perspectives, personal and community health, population growth, natural resources, environmental quality, natural and human-induced hazards, science and technology in local, national, and global challenges

Reference

Experiment designed by Bob Becker, Kirkwood High School, Kirkwood, MO.

"Salt Crystals—Science Behind the Magic," C. F. Davidson and M. R. Slabaugh, *J. Chem Ed.*, February, **2003**, p 155.

Smith, Trevor, "Salt", *CHEM Matters*, December, 1992, p 4–6.

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Does "Salt Sense" Make Sense?* activity, presented by Kathleen Dombrink, is available in *Measurement Lab Activities* and in *Density Lab Activities*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

Materials for *Does "Salt Sense" Make Sense?* are available from Flinn Scientific, Inc.

Catalog No.	Description
AP2296	Cylinder, Polymethylpenlene, 50 mL
OB2090	Balance, Electronic
AP8256	Magnifier, Reading Glass 2.5X

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.