# Elementary Science Investigations With the SmartMicroScope

**By SmartSchool Systems**





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# Welcome to the Elementary Science Investigation with the SmartMicroScope

## Preface

**Dear Instructor,**

**This investigation manual was designed specifically for your ease of use. It is written in such a way to make it easy to implement in your classroom.**

**These investigations will engage today's tech-savvy students and challenge them with a hands-on approach to science. We are confident that your students will enjoy the wonder of EXPLORING science.**

**As an educator your feedback and input is of tremendous value. Please feel free to contact us with comments or suggestions.**
**Sincerely,**

**The Curriculum Team**
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# Contents

# Kitchen Gems

## Investigation Overview:

Most natural minerals which are not made from living substances are made up of crystals. The crystals of a substance have regular shaped sides and edges if they have been allowed to form naturally. Different substances have different shaped crystals. Large crystals are rare, but with a microscope you can see the tiny ones that are all around us.

## Objective:

Students will observe, compare and record the size, shape, color and texture of salt, sugar and other common crystalline kitchen substances. Students will understand crystals are repeating symmetrical patterns that show the internal atomic structuring of the substance. Students will make predictions based on observed patterns, and recognize that a mixture is created when two materials are combined.

## Materials:

SmartMicroScope digital microscope with gooseneck stand
Hand lenses for each group
Small paper plate or other container for each group
Black construction paper per group
Microscope slide per group (transparency film works also)
Kitchen substances (Table Salt, Granulated Sugar, Baking Soda, etc.)
Warm Water
Pipette or eye dropper

## Preparation:

Set up the SmartMicroScope with gooseneck stand on a flat surface. Prepare the observation areas by placing the black construction paper on the plate making sure that it sits flat on the plate. Place the microscope slide on top of the construction paper.

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## Engagement:

Hold up or display a salt shaker and ask the students to describe salt. What color is it? Is it a liquid, solid or gas? Is salt large or small? What shape is salt? Are all the pieces the same size? What about sugar? Are they the same? What about baking soda?

What do these three kitchen substances have in common? (all three are crystalline structures meaning they are made of geometric patterns which repeat)

## Exploration:

1. Students will place a small amount of Table salt on the slide.
2. Students will observe and note the characteristics of the salt with 1) naked eye; 2) hand lens; 3) SmartMicroScope at various magnifications. Noting how the appearance changes as the magnification increases (gets bigger).
3. Students will do as above for sugar.
4. Students will do as above for baking soda.
5. Students will note differences between the salt, sugar and baking soda crystals, i.e., size, shape

## Explanation:

Every crystal has an orderly repeating pattern which is symmetrical. As the crystal 'grows' it repeats the pattern. The crystal you see shows the internal arrangements of the atoms. Did you notice that salt is cube shaped? The corners on the Table salt appear rounded. That rounding is due to the manufacturing process where the salt crystals 'bump' into each other.

Naturally formed crystals have straight sides.

All minerals (like those in rocks) have crystalline structure. Some minerals are marble, quartz, feldspar, and mica.

Jewels/Gems are mineral crystals cut and polished. Diamonds are crystals.

Crystals can be grown in the laboratory.

Crystals are used in the computer industry in semiconductors.

Crystals are used in watches and clocks.

Crystals are used to conduct electricity.

## Expansion:

## Dissolving Salt in Water –

- Ask: "What would happen to the salt if we put a drop of water on it?" Allow students to discuss what will happen to the salt. Remove nearly all the salt from the slide, but leave about 10 grains near the center of the microscope slide. Use the gooseneck stand to hold the SmartMicroScope about an inch over the slide and focus on the salt. Use the Zoom feature in the software to focus in on a single grain of salt. Begin recording a video. Use a pipette or eye dropper to gently place one drop of water on the grains of salt. You may need to quickly re-focus the SmartMicroScope on the salt since the water may distort it a bit (there's a complete lesson in what causes that). Observe what happens to the salt.

- Allow the salt to evaporate and examine what remains. The salt and water mixture does not involve a chemical reaction and can be "undone" by simply allowing the water to evaporate. When this occurs, only the salt remains.

- You may have noticed the rounded corners on the table salt crystals when it was first examined. This rounding of the corners is not a natural occurrence, but happens in the salt factory as the salt passes through several large vats. The crystals bump into each other in the vats, smoothing out the sharp edges.

- The salt that remains after the water has evaporated is smaller, but much "sharper" without rounded corners.

## Evaluation:

- Students will identify one use for crystals.
- Students will draw the crystal shape for salt.
- Students will draw the crystal shape for sugar.
- Students will draw the crystal shape for soda.
- Students will state whether the crystals they observed had straight or curved sides.
- Students will identify one crystal other than sugar, salt and soda.
- Students will state whether each crystal that grows looks the same as all others.
- Students will identify whether crystals are salt or sugar.
- Students will know whether all crystals clear or white.
- Students will identify a common crystal that engaged/married women in the U.S. wear.

# Student Worksheet -- Kitchen Gems

| | |
|---|---|
| | 1. Draw a salt crystal. |
| | 2. Draw a sugar crystal. |
| | 3. Draw a baking soda crystal. |

4a. This is _____.

4b. This is _____.

5. Do all crystals have the same shape? _____

6. Are all crystals clear or white? _____

7. What crystal do engaged/married American women wear? _____

8. Name a crystal other than salt, sugar and baking soda. _____

9. Name one thing crystals are used for. _____

10. Did the salt, sugar and/or baking soda crystals have straight or curved sides?

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