ACTIVITY 5

WHERE DOES SALT COME FROM?

EXPERIMENT OBJECTIVES AND CONTENT

In this activity, students discover where salt comes from and explore its various uses in everyday life.

ESSENTIAL KNOWLEDGE

Matter:
- Properties and characteristics of matter on Earth: soil, water, air
- Organization of matter: crystals, structure of the Earth

Techniques and instrumentation:
- Use of simple observational instruments

Appropriate language:
- Terminology related to an understanding of Earth and the universe

SUGGESTED MATERIALS

Scientific equipment:
- Magnifying glasses
- Microscopes
- Droppers
- Scales

Perishable non-scientific materials:
- Water
- Ice cubes

Household materials:
- Containers
- Mortar
- Salt mill
- Table salt
- Coarse salt
- Fleur de sel
- Colored salt: Guérande salt (grey), Himalayan salt (pink), black salt from Hawaii
- Sand
- De-icing salt
- Salt for water softeners

School supplies:
- Dark colored paper (navy blue, brown or black)
- White paper

CONTEXT: SITUATIONAL PROBLEM OR RESEARCH QUESTION

Do you know where the salt you sprinkle on your food comes from? Do you think it's the same salt we spread on roads in winter so we don't slip?

SUGGESTED PREPARATORY ACTIVITIES (INTRODUCTION)

The students do a quick search in books or on the Internet to find out where salt comes from. What kind of salt is used in cooking? What does it look like? They could also ask the school janitor about the salt spread on the outside steps in winter.

INITIAL IDEAS AND HYPOTHESES

Here are a few examples of hypotheses the students might formulate based on their initial ideas:

Example 1
I predict that if I crush coarse salt I will get table salt. I predict this because at home, when I use the salt mill with coarse salt in it, finer salt comes out.

Example 2
I predict that if I look at different kinds of salt under the microscope, the crystals will not all have the same shape. I predict this because they do not all have the same color.

Example 3
I predict that if I mix water and salt, the salt will disappear. I predict this because when I add salt to my food, it disappears.

Example 4
I predict that if I let salt water dry up on the window ledge, the salt will reappear. I predict this because in winter, white marks appear on my boots after they dry out.

Example 5
I predict that if I put an ice cube in de-icing salt, it will melt quickly. I predict this because in winter, my dad spreads salt on the stairs to melt the ice.

WORK PLAN AND EXPERIMENTATION

Here are a few examples of experiments the students can carry out to verify their hypotheses:

Example A
The students examine coarse salt crystals under a magnifying glass or microscope then grind the crystals to obtain fine salt, which they also observe. If fine table salt seems to come from coarse salt, the students could ask themselves about where coarse salt comes from. They might also read the labels on boxes and packages of salt.

RECORD ALL YOUR IDEAS AND OBSERVATIONS IN YOUR EXPERIMENT WORKBOOK.

Example B
The students observe different types of salt under the magnifying glass or microscope. They compare the shapes of the crystals of colored salts and find out where they come from by reading the labels of the various salt containers.

Example C
The students dissolve different types of salt, placing greater or lesser amounts of salt (a pinch, a spoonful, etc.) in water.

Example D
The students find a technique for extracting salt from water. They evaporate the salt water by placing it in the sun for a few days, preferably on a dark piece of paper, then observe what happens. Some may want to use their sense of taste to verify the presence of salt if it is not easily visible.

Example E
The students compare the effects of table salt and road salt on an ice cube.

EXPERIMENTAL FACTORS
To ensure scientific rigor, the students should evaluate the experimental factors that might influence the experimental results.

- Accuracy of measurement of amounts of salt and water
- Total amount of salt in the water

DISCUSSION: SUGGESTED INTEGRATION ACTIVITIES (CONSOLIDATION)

The students will be better able to answer the initial question if they pool their results. Were they able to verify their hypothesis? Each team could present to the others what they decided to do to find out where salt comes from and what results they obtained from their experiment.

SUGGESTED ACTIVITIES FOR APPLYING KNOWLEDGE (APPLICATION)

The activity could be enriched by suggesting that the students do research into the presence of salt in their food. According to the latest Canada Food Guide, do they consume too much salt?

SCIENTIFIC CONCEPTUAL CONTENT

Surf or turf?
Salt can be extracted from salt deposits (halite, or rock salt) and from seawater (sea salt). Salts look and taste different depending on their origin and the amount of minerals they contain.

Coarse salt
Coarse salt, which comes from salt deposits found throughout the Earth's crust, is produced worldwide but mainly in the United States, China, Germany, Canada, and India. The sole salt deposit in Québec, the Rocher-aux-Dauphins deposit, is located in the Magdalen Islands. The deposit occurs at depths ranging from 30 to 300 m, contains over 100 million tons of salt, and produces about 1 million tons per year. This salt is used exclusively for de-icing roads in Québec, New England, and Newfoundland and Labrador.

Sea salt
Sea salt is produced in salt evaporation ponds, clay basins of varying depths and slopes in which salt water circulates. The salt is extracted by evaporating the salt water under the combined action of the sun and wind. Salt workers, or salt-marsh workers, then collect the salt by hand between June and September. For example, at Guérande, in France, a salt worker may harvest an average of 85 tons of salt over the course of a summer, and another 2 to 3 tons of "fleur de sel," which are tiny salt crystals that form on the water's surface when wind conditions are favorable. Salt evaporation ponds occur only in the Northern Hemisphere, especially along the Atlantic coast of France, the Mediterranean coast, and in California's San Francisco Bay.

CULTURAL REFERENCES

Essential to life

While salt is familiar to us as a substance that enhances the flavor of foods, it is above all something that is vital and essential for our bodies to function properly, just like water and air. In fact, salt can be found in all the body's liquids: tears, urine and sweat, for example. Everyday, we lose salt (mineral salts) and this is why we must drink water and eat foods that naturally contain salt. Too much or too little salt can lead to serious physiological problems (e.g., hypertension and obesity). According to Statistics Canada (2004), Quebecers consume far too much salt–1 gram more than standard recommended daily amount of 2.3 grams per day. In fact, 85% of men and 60% of women exceed this amount. It's all a question of proportion and taste.

Unusual fact

Did you know that we may owe the discovery of salt to animals? Human beings may have simply imitated them. For example, monkeys that live near the sea dip their food in water. Antelopes, gazelles and bison travel kilometers to find and lick rocks that are rich in salt, which is so vital to their survival.

Multipurpose salt

Salt has long been used as a preserving agent (especially for meat). It is a raw material in the chemicals industry (in the manufacture of chlorine and sodium hydroxide, which in turn have many other uses), and it is used to de-ice roads, soften water, as well as in the pulp and paper industry. It is also employed in the food industry to enhance the taste of prepared dishes, soups, vegetable juices, etc.

Science and technology

To avoid having to bring huge amounts of freshwater with them on their ships, sailors use desalination systems that "filter" seawater to produce fresh water, providing them with water to wash with and, above all, to drink.

History

Did you know that the word "salary" originated in ancient Rome, where salt (from the Latin word sal) was a rare luxury and given as pay to soldiers.

FOR MORE CULTURAL REFERENCES, VISIT THE ÉCLAIRS DE SCIENCES WEBSITE:

www.eclairsdesciences.qc.ca

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Conception
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PROCESS OF ACTIVE DISCOVERY

GENERAL LEARNING PROCESS IN SCIENCE AND TECHNOLOGY (IN ELEMENTARY SCHOOL)

Context related to everyday life

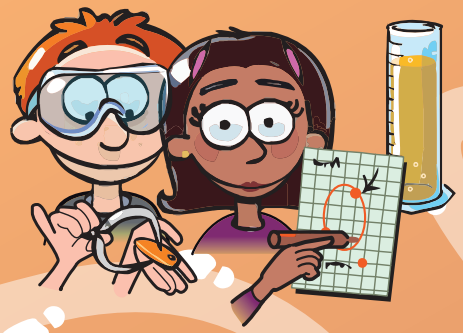
- **Situation problem** or
- **Discovery question** or
- **Need to be fulfilled**
- **Question related to the operation of an object** (how does it work?)

Initial ideas and hypothesis

My initial ideas:
- I share my own ideas.

My hypothesis:
- I predict that... I think that because…
- I imagine my prototype.
- I think it works like this…

Planning and carrying out



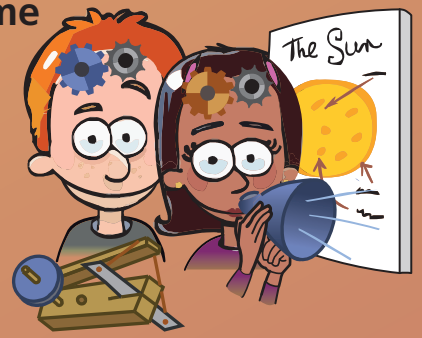
My equipment:
- I observe and handle the equipment.
- How could this equipment be useful to me?
- I choose my equipment and my materials.

Carrying out my process:
- What will the steps be?
- What precautions should I take?

My actions:
- I carry out the steps of my protocol.
- I note or draw what I observe, what I do and what I discover.

My results:
- What is my answer to the problem, question or need?

Outcome



My outcome:
- Do my results confirm my hypothesis or not?
- Are my results similar to those of the other teams?
- Can the other teams' results help me to find answers to my problem, my question or my initial need?
- What could I communicate concerning my discoveries?

New question?

What I learned:
- What do I retain from this activity?
- What could I communicate concerning my results or my discoveries?

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