

# SALT I: CRYSTALS!

## OVERVIEW

This lesson introduces students to the concept that there is salt (NaCl) in our bodies as evidenced by the salty taste in our sweat. They discover that our bodies need salt. They learn that one area in which salt is used, in the body, is in the generation of the Action Potential in the nervous system. The students will also be introduced to the concepts that every tangible thing is matter; matter is composed of atoms, and salt is a form of matter that can be composed of atoms of sodium (Na) and chloride (Cl). They are told that salt is used in the generation of the Action Potential, because of the nature of the sodium and chloride atoms. They are left to ponder how these atoms could generate electricity.

## GOAL

Students discover that there are salts in the body and salts generate electrical energy in the body. Finally the students should be able to visualize that a solid salt crystal is actually composed of atoms of sodium and chloride through the construction of large salt crystals made of transparency paper with representations of the Na and Cl atoms.

## SPECIFIC OUTCOMES

- Use science instruments
- Take lecture notes
- Make, record and communicate observations
- Practice teamwork and peer collaboration

## MATERIALS

- Clipboards
- Notebook paper
- Table Salt
- Hand held microscopes
- Salt crystal visual made with pieces of self laminating sheets, taped together to form a rectangular hexahedron onto which circles of theatrical gel scraps have been stuck.
- Self-laminating sheets
- Theatrical gel scraps cut into circles
- Tape
- Crossword puzzle evaluation homework

### Grade Level: 5

**Subject Areas:** Science and Health

### Key Concepts:

- There are salts in the body
- Salt (NaCl) is important in neuronal signal transmission
- Matter is composed of atoms
- Sodium Chloride is a salt composed of sodium atoms and chloride atoms

### Key Cognitive Skills

- Observation
- Comprehension
- Note Taking
- Data collection

**Duration:** 60 minutes

**Setting:** Indoors

3-4 workstations will be used for viewing samples under hand-held microscopes.

### Background Information

The messages that travel through the brain and along the nervous system are electrochemical, composed of electrical and chemical signals. Neurotransmitters are chemicals that participate in neuronal signal transmission. The Action Potential (AP) is the electrical impulse that travels along the axon during neuronal signal transmission. The Action

Potential is generated by an influx of sodium ions into the axon. The influx of sodium ions changes the electrical balance maintained along the axon. The charges on the ions and the difference in charge between the exterior and interior of the neuron drive the electrical forces of the neuron.

## PROCEDURE

*Engage: (25 minutes)*

- Warm-up movement to music. Electric slide good choice as it ties into generation of electrical energy. Dance should make some students and instructors sweat.

- Students gather to carpet for discussion and use clipboards (supplied with paper and pouch containing art supplies to be used latter during expedition) for any notes.

(During this time assistance could be utilized in setting up the microscope viewing stations)

- "Can anyone here tell us how sweat tastes?"

Lead to salty

- "Why do you think that is?"

Lead to the concept that we have salt in our bodies and we sweat it out

- "You think salt may be important in how we work?"

Lead to the affirmative, can use Gatorade example. Gatorade is named after the Florida Gators because the amount of electrolytes in its formulation was determined by analyzing the sweat of the Florida Gators football team. Many sports organizations feel that it is important to drink formulations like Gatorade to replace lost salts in order to maintain peak performance.

- "Who wants to tell me what they know about salt or maybe what salt could be doing in the body?"

Lead to the generation of electrical energy and the Action Potential.

- "In order to understand how the body uses salt to generate the Action Potential, we'll have to take a closer look at salt. I'm going to pull your names out of this box. When I pull your name, you'll go to one of the stations behind you to use a microscope to take a closer look at salt."

*Explore: (10 minutes)*

- Students whose names are pulled go to the microscope stations for 5 min viewing of salt and rough sketch of what they see.
- Students remaining on carpet get to participate in an interactive review of their notes on salts.

- Salts are in the body

- Salts are used in the generation of electrical energy like the Action Potential.

- "Returning viewers" participate in an interactive review of their notes.

*Expand: (17 minutes)*

- Students return to carpet for discussion of composition of salt.
  - "So in a shaker salt looks like this."  
Hold up shaker of salt
  - "When you looked at salt under a microscope, what did you see?"
- Encourage students to share their drawings and descriptions of their drawings with the rest of their team members. Lead discussion to cubic shape and the difference in structure we see with a change in perspective.
  - "If we could look even closer at table salt we might see something like this."
- Hold up salt crystal visual made with pieces of self laminating sheets, taped together to form a rectangular hexahedron onto which circles of theatrical gel scraps have been stuck.
  - "If we could look even closer, at an elemental or atomic level, we would see that what appears to be a solid crystal of table salt, is really a bunch of sodium atoms and chloride atoms all stuck together"
- Discuss visual
  - " Salt isn't the only thing made out of atoms. Everything we can touch, see, taste or smell is made of atoms. What are some things you can think of that might be made of atoms?"
    - "Yes, that's right, just about anything you can think of is made of atoms, and anything made of atoms is called matter. So what are some things we would call matter"
      - "And why can we call this matter"  
Lead to...because it's made of atoms
- Hold up salt crystal visual
  - "So yes are no, is salt matter?"
  - "And why is salt matter?"  
("because it's made of atoms")
  - "What kind of atoms?"  
("sodium and chloride atoms")
- "In the time we have left we're going to make some models of sodium chloride crystals. We're going to take these clear sheets and draw red circles on them for sodium atoms and yellow circles on them for chloride atoms. Then we're going to tape six pieces together to form our 3-d models of table salt."
- Students spread out on floor and stick gel circles representing atoms on self-laminating sheets like large model in front of class.

- Notes are collected while the students work.
- After @ 7 min sheets are collected and taped together.

*Evaluate / Wrap-up: (5 minutes)*

- "Today we learned that salt is made of what kind of atoms?" ("Sodium and chloride")
- "And sodium atoms cause what to happen in our neurons?" ("The Action Potential")
- "The Action Potential is what kind of impulse?" ("Electrical")
- "I wonder what it is about these sodium atoms and chloride atoms that causes the electrical activity. You all think about that and we'll talk about it next week."
- Distribute evaluation crossword puzzle to be completed as homework.