

SALT II: SOLUTIONS!

PART 1

OVERVIEW

Students add salt to water and see that it “disappears.” They use the data collected during the activity to determine if the salt is still in the water.

GOAL

Students use data to support their hypotheses.

SPECIFIC OUTCOMES

- Use science instruments
- Follow written procedures
- Make, record and communicate observations
- Use calculations in analysis
- Make hypotheses
- Practice teamwork and peer collaboration

MATERIALS

For instructor

- Procedure Poster

For each pair of students

- Salt
- Water
- Weigh boats
- Graduated plastic tubes with caps
- Scales
- Slides
- China marker
- Plastic pipettes with built-in bulbs

For each student

- Clipboards
- Observation / hypothesis handout

Grade Level: 5

Subject Areas: Science

Key Concepts:

- Table salt is composed of sodium atoms and chloride atoms
- In water the sodium and chloride atoms of table salt separate to form a salt water solution
- In the body the sodium and chloride atoms separate
- The separated sodium and chloride atoms in the body play a role in the body's electrical energy.

Key Cognitive Skills

- Observation
- Comprehension
- Analysis
- Hypothesis
- Note Taking
- Data collection

Duration: 60 minutes

Setting: Indoors

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 sodium ions come from the table salt or sodium chloride we ingest. Once sodium chloride enters the body, the sodium and chloride atoms separate as they do in water. Once separated the sodium and chloride atoms carry a charge and are thus referred to as ions, charged particles. 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 /Explain: (12 minutes)

• Students gather in the front for review / introduction discussion. Review sheet completed during last lesson .

At this time an assistant could distribute supplies to student desks. If there is no assistant, students can remain at desks, and supplies distributed after talk

Introduction:

"Today we're going to look at what happens when we combine salt with water, because the form salt takes in water is the form of salt your body uses."

• Put up poster with procedure, and have students follow along on their procedure observation handout

Explore 20 minutes

• Instruction on use of scales with warning of delicacy of instrument.
• Students weigh out salt with scales use instructions and complete their production of salt water, recording their observations at every step.

Expand: (20 minutes)

5 min. Students discuss their observations as a class. Student ideas on "what happened to the salt?" are discussed. Students encouraged to further investigate situation.

"I'm going to argue that the salt is still in the tube. You work in your groups and using the observations you currently have and any other observations you can make, using the instruments in front of you, prove that the salt is still in the tube. Turn to the back of the last page of your handout. As you work to prove the salt is in the tube write down, in the space provided, what you are doing."

15 min. Students work in groups to prove that the salt is in the tube. Instructor/s work with individual groups to guide and insure procedures are recorded.

Wrap-up: (8 minutes)

"Who looked at the weight of the water in the tube before you added the salt and after the salt disappeared?"

"Who looked at the volume of the water in the tube before you added the salt and after the salt disappeared?"

"If we looked at the weight and volume of the water in the tube, before and after the salt was added, we could see that the weight and volume of the water in the tube increased with the addition of the salt, showing that the salt is still in the tube. We can't see the salt crystals in the tubes because the sodium atoms and chloride atoms have separated and are now spread throughout the water in the tube. When the atoms of matter like salt separate in liquids like water, we get a solution. This salt water is a solution because it contains the separated atoms of the salt in the water. Salt goes into solution in our bodies and it is these separated atoms that help make, or generate, the electrical energy of the body."

"Next week we'll take a closer look at salt and water to see why the atoms of the salt crystals separated and how this allows the sodium and chloride atoms to generate the electrical energy of the body."

INSTRUCTIONS FOR MAKING SALTWATER

Step 1: Weigh out 4 grams (4.0g) of salt in the weigh boat and then set the salt in the weigh boat to the side.

Step 2: Use the graduations, or markings, on your tube to squirt 25 milliliters of water into your tube from the water bottle at your station. Record your observations of the water in the tube.

Step 3: Add salt to the tube, do not shake the tube. Record your observations of the salt in the tube.

Step 4: Shake the tube and record your observations

Step 5: Take a glass slide and using a china marker, put the initials of you and your partner on the slide. Then take the pipette and drop a tiny drop of the mixture from the tube onto the slide. Set the slide aside. We will allow it to dry over the next week and examine it at our next Brain Explorers expedition.