Michelle Butterworth

Nichole Penix

Jody Sailor

Fall 2002

Part 1:

Water Properties of Great Salt Lake

Abstract: This mini-unit is an introduction to the Great Salt Lake (GSL), and the effects of salinity regarding water properties (specifically freezing). This unit should follow a unit on the water cycle, to ensure understanding. Through experimentation and observation the students will be able to understand water properties and how salinity level(s) can affect this. This particular study will take place in a specific ecosystem, the Great Salt Lake.

Grade Level: Fourth

Utah Elementary Core Curriculum Standard:

Standard 1: Students will understand that water changes state, as it moves through the water cycle.

Objective 1: Investigate and record temperature data to show the effects of heat energy on changing the states of water.

In Class Time: 3 hours

Terminology:

Brine: Water containing a significant amount of salt.

Brine Shrimp: A small crustacean that lives in salt lakes and brine pools. They are used as food for aquarium fish.

Buoyancy: The tendency of a liquid or gas to cause less dense objects to float or rise to the surface.

Ecosystem: A localized group of interdependent organisms together with the environment that they inhabit and depend on.

Freezing point: To become covered, or cause the surface of something to be covered with ice.

Salinity: Level of salt content dissolved in water.

Saturated: Completely packed or full, so that no more can be added. (In terms of the GSL salt)

Intended Learning Outcomes:

- Students will be able to explain salinity in their own words.
- Students will be able to demonstrate their knowledge in regard to salinity levels and the water property, freezing (through experimentation).
- Students will understand buoyancy through experimentation at the Great Salt Lake.

Background Information:

Great Salt Lake is a very unique ecosystem. This ecosystem relies on the high salinity level for survival. Great Salt Lake is typically two to five times saltier than the ocean. The lake is located in a desert biome, which makes it unique. It is fish free, but full of brine shrimp. These brine shrimp are harvested for aquarium fish food and even for pets (sea monkeys). People used to go to Great Salt Lake in large numbers to swim and float due to buoyancy. At one time Saltaire, which was located on the beach of the Great Salt Lake, hosted many people for various concerts and activities. In its glory days, it laid claim to the nations largest dance floor.

Materials: KWL sheets

Basic water cycle worksheet

Buoyancy materials (Popsicle sticks, pom-poms, straws, pebbles, pipe cleaners, and any other objects you wish to try at the GSL…)

Journals

Magazines (for collages)

Means for a field trip (transportation, parent volunteers, etc.)

Prior Knowledge Assessment:

The students will complete the KWL sheet before and after the field trip. They will complete the “K” and the “W” portion prior to the trip, and the “L” after. They will also complete a worksheet regarding the basic water cycle before the trip, to ensure complete understanding of this subject.

Procedures:

1. The lesson will begin with the water cycle worksheet. Following this worksheet we will discuss the Great Salt Lake in terms of an ecosystem. We will talk about what an ecosystem is.
2. Next they should receive their KWL sheets. Have the students begin the process with the “K” section and then move to the “W” section of the worksheet.
3. As the students head out for the field trip to the Great Salt Lake, they must have their journals with them. While at the lake, the students are to write and draw what they observe. Have them draw the water cycle, using the Great Salt Lake as their visual. Have them describe the process in specific terms: evaporation, freezing and salinity. Have them hypothesize about the effects the salinity may have on these key terms. Set up the field microscopes so that the students have a chance to see brine shrimp and other organisms. Have them check for buoyancy by testing the various materials that were brought for this portion.
4. The students should record their findings in their journal, with an explanation of why they think the items did or did not float.
5. The students will be separated into partnerships to share their journal findings (also indicated in assessment portion).
6. Finally, the students will make a collage out of magazine clippings and items that they collect from the GSL. These collages will be made with partners and must include at least three magazine clippings and two items from the GSL (also indicated in assessment portion).

Closure:

The students will complete the “L” portion of their KWL sheet. They will then share their journal entries with a specific partner. Each partnership will create a collage, using magazines and items found at the GSL. These collages will be displayed within the classroom.

Assessment:

The collages will visually demonstrate their newfound knowledge of the Great Salt Lake. The collage must have three things from a magazine and two things found at the GSL. The KWL sheet will provide specific details regarding what they’ve learned. It must contain no less than seven entries in each section. The

water cycle worksheet will be collected and graded. It will assess their prior knowledge and their own explanation of water properties (salinity level, freezing, and evaporation).

Michelle Butterworth

Nichole Penix

Jody Sailor

Fall 2002

Part 2:

Does the Great Salt Lake Freeze?

Abstract: This experiment is focused on the level of salinity in which water will and will not freeze. While conducting this experiment, no less than three times, students will answer the following questions: Does the water at the Great Salt Lake freeze or does the salt not allow that to happen? Will water freeze if there is a higher salinity level than the Great Salt Lake?

Utah Elementary Core Curriculum Standard:

Standard 1: Students will understand that water changes state, as it moves through the water cycle.

Objective 1: Investigate and record temperature data to show the effects of heat energy on changing the states of water.

Terminology:

Freezing point: To become covered, or cause the surface of something to be covered with ice.

Salinity: Level of salt content dissolved in water.

Saturated: Completely packed or full, so that no more can be added. (In terms of the GSL salt)

Intended Learning Outcomes:

- Students will be able to observe the affects salt has on certain water properties (in particular freezing).
- Students will be able to measure salt and water to create the appropriate salinity levels.
- Students will be able to predict possible outcomes of this experiment in terms of a hypothesis.

Prior Knowledge:

- Students will engage in a class discussion regarding their previous activities such as the water cycle worksheet, collages, and KWL worksheets.
- Students should understand the meaning of salinity and how it is measured.

Teaspoons	Grams	% Salt	Amount of Water
1 ½ tsp.	10 g	1%	4 cups
7 tsp.	50 g	5%	4 cups
14 tsp.	100 g	10%	4 cups
28 tsp.	200 g.	20 %	4 cups

Materials: (multiple by three, since experiment will be conducted three times to insure accuracy)

1. 6 large zip lock baggies (3 to put water in and 3 to double bag the others so there are no leaks) or any other freezer safe container can be used
    a. Two for GSL water
    b. Two for 50% salinity
    c. Two for 80% salinity
2. Markers to label baggies
3. Salt (table salt)
4. Measuring Cup (water)
5. Measuring Spoons (salt)

Hypothesis:

Students should create a hypothesis about whether or not each baggie of water will freeze. They should use their prior knowledge of salt to help with their hypothesis.

Procedure/Experiment: (This experiment should be conducted three times to insure accuracy of conclusions)

1. Label plastic baggies
    a. GSL water
    b. 50% salinity
    c. 80 % salinity

2. Measure water
3. Measure and put GSL water in a baggie, seal, double bag it (to insure no leakage), and set aside
4. Measure water and mix in 1-1/2 cups & 8 Tbsp. salt to create 50% salinity. Then put the water in a baggie, seal, double bag it, and set aside.
5. Measure water and mix in 14 cups salt to create 80% salinity. Then put the water in the baggie, seal, double bag it, and set aside.
6. Place baggies in freezer
7. Leave baggies in freezer for a week. However progress should be checked on throughout the week.

Record Results:

Students should check the freezer each day to record the progress of their baggies. The results should be recorded in the students' lab notebook or the available handout which can be hooked in to the lab notebook. This should continue for one week to insure that the water as amply amount of freezing time.

Closure:

As a class discuss why the baggies did or did not freeze and draw a conclusion.

Ask students if they have any more questions pertaining to salinity and water.

Assessment:

Students will need a formal scientific write-up in their lab note books containing the following:

- Hypothesis must be clearly stated (I think…..because…)
- Materials used need to be clearly listed
- A diagram of experiment (including each salinity and water measurement)
- Ongoing data collection of results
- Conclusion/results
- Is the hypothesis supported or rejected

Salt Water Freezing Experiment

Name:_____

Date:_____

Day of Experiment:_____

Experiment #:_____

What is your prediction for today?

I predict…

What are your observations?

What actually happened, and why?

Experiment #:_____

What is your prediction for today?

I predict…

What are your observations?

What actually happened, and why?

Experiment #:_____

What is your prediction for today?

I predict…

What are your observations?

What actually happened, and why?

Michelle Butterworth

Nichole Penix

Jody Sailor

Fall 2002

Part 3:

TIC-TAC-KNOW

Abstract

This game is designed to help students and teacher review the information that they gained through "Water Properties of the Great Salt Lake" and "Does the Great Salt Lake Freeze." It is played much like Tic-Tac-Toe.

Grade Level: Fourth

Utah Elementary Core Curriculum Standard:

Standard 1: Students will understand that water changes state, as it moves through the water cycle.

Objective 1: Investigate and record temperature data to show the effects of heat energy on changing the states of water.

Terminology:

Brine: Water containing a significant amount of salt.

Brine Shrimp: A small crustacean that lives in salt lakes and brine pools. They are used as food for aquarium fish.

Buoyancy: The tendency of a liquid or gas to cause less dense objects to float or rise to the surface.

Ecosystem: A localized group of interdependent organisms together with the environment that they inhabit and depend on.

Freezing point: To become covered, or cause the surface of something to be covered with ice.

Salinity: Level of salt content dissolved in water.

Saturated: Completely packed or full, so that no more can be added. (In terms of the GSL salt)

Materials Needed

- Chart with grid drawn on it like the diagram below or
- Chalkboard with a grid drawn on it
- Five piles of colored cardboard or construction paper squares which are the same size as the grid squares
- Questions prepared with numbers and letters to correspond to the grid.

Procedures

- Divide the class into 5 teams if two to six players each. More students will be involved if the teams are kept small. Identify each team with a color corresponding to the colored squares.
- The teacher reads a question to the class.
- The teams may discuss the answer; then when a team has the answer, the team leader stands and gives his team color. He remains standing until a second team leader stands and calls out his team color. Anyone speaking after that will bring a penalty of -2 for his team.
- The first team leader to stand then answers the question himself or calls on a team member to answer it. Only one person gives the answer, and he must not receive any help at this point. (All help and discussion ended when the team leader stood.)

- If the first team misses the question, they get a -1 point; the second team leader may then answer the question himself or call on a team member to answer. If the answer is correct, the team places a grid color card of his team's color in the square he chooses on the grid chart or chalkboard. If the answer is incorrect, the team gets -1 point.
- A team scores three points when they have three team-colored squares in a row on the board. The three squares can be in any direction and can include one square of a previous score.
- Continue the game until all the blanks are filled or all the questions are answered.
- Write the accumulated scores on the chalkboard.
- The object is for each team to get as many points as they can and keep the other teams from scoring.

Variations

- The teams can simply take turns and call out an ordered pair such as: A-3 or B-4 or D-2. The teacher then simply looks at the list of question which has these numbers on them and gives the question with the combination given. The team must then answer the question correctly to be able to claim that square in the grid. The rest of the rules are the same.

Possible Questions

- What is the definition of brine?
- What is a Brine Shrimp?
- What is the definition of buoyancy?
- What is an Ecosystem?
- What is the meaning of "freezing point"?
- What is the definition of salinity?
- What does saturated mean?
- How much saltier is the Great Salt Lake than the ocean?
- What animals live in the Great Salt Lake?
- Why are people able to float in the Great Salt Lake?
- What is the salinity level of the Great Salt Lake?
- What is a hypothesis?
- What are the main components needed in order to conduct an experiment?

Evaluation/Assessment:

Students will be evaluated on the correctness of their answers. Also, students will need to show courtesy to other players and good sportsmanship.