

Lynette Bodell  
Olivia Clark

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## **Which sand contains the most salt?**

### **Abstract:**

During this lesson, students will have the chance to test how much salt is contained in types of sand from the Great Salt Lake, and other places. Students will create a hypothesis about which sand contains the most salt and test the salt to accept or reject their hypothesis. Types of sand include oolitic fine and coarse, salt flat sand, beach, and clay. Students will dissolve the salt in warm water, and then evaporate the water to see how much salt is left.

### **Utah Elementary Core Curriculum Standards:**

**3040-0501** Gather data on the components of soil.

- Estimate the amount of mineral and organic materials there are in a given sample.

**3040-0502** Determine soil types such as sand, clay, and silt.

- Analyze a sample of soil for particle size and type, color, odor, and texture.
- Compare compaction of various soils.
- Categorize several soil samples.

**In-Class instructional time:** 30 min

### **Terminology:**

Students have already been exposed to these words in the Unit Overview Lesson Plan, but it might be wise to review.

**Oolitic sand:** The round, brown-to-white grains that make up many of the beaches around the lake are called oolites. Oolites are small spherical to elongated grains composed of concentric layers of calcium carbonate built up around a central core, much like a pearl. The core material is usually a small mineral grain, or a brine shrimp fecal pellet. Some of the most beautiful beaches around the lake are composed of oolitic sand.

### **Objectives:**

Students hypothesize which sand contains the most salt.

Students conduct an experiment to test a hypothesis.

Students explore the makeup of the different types of sand.

### **Background:**

The Salt content of the lake varies from 9% to 28%. Early 1990 percentages: North arm: 18%, south arm: 9%. The ocean average is 3%. The total amount of salt dissolved in Great Salt Lake is about 4.5 to 4.9 billion tons. Salt can be found all around the lake in many varieties and

salinity. For more information see: <http://www.ugs.state.ut.us/online/> and click on “Great Salt Lake”

Students need to know information about oolitic sand.

<http://www.ugs.state.ut.us/online/PI-39/PI39PG14.HTM>

This is an oolite cross-section showing concentric layers built up around a central mineral fragment. Showing students this picture on the Internet will help them understand what oolitic sand is, and how it is formed.

Refer to terminology section for more information on oolitic sand.

### **Materials:**

Microscopes

Petri dishes

Salinity meter (if available)

A scale that will weigh small amounts accurately

ml tubes

De-ionized water

Types of sand: oolite fine, oolitic coarse, salt flat sand, beach, and clay

Hot plate to warm water or microwave

Jar to put hot water in to easily pour

Dry erase marker

Leveler or knife to level the sand in the teaspoon

Teaspoons

Pipettes

### **Prior Knowledge Assessments:**

Some students might know a lot about the salt at the Great Salt Lake, and others may know very little. Get the students thinking by sharing with the class something they know about the Great Salt Lake. This will help the students learn from each other, help you as a teacher to get a feel for what the students know, and help the students start thinking. If students do not mention anything help them by asking them questions like: What kinds of things/animals can you find in the Salt Lake? What is the lake famous for? What kind of landforms can be seen around the lake? After the students have been brain storming for a while, ask the students what they know about the salt in the lake.

### **Procedure:**

Students were previously able to view the types of sand under the microscope in the introductory lesson. Have this available again if you want.

**Hypothesis:** Students should create a hypothesis for which sand they think contains the most salt. Students should take into account their observations of the sands, and where the sand can be found.

### Experiment:

To correctly test the salinity level of the water, 3 samples of each are needed. Having 3 samples makes it possible to average the three measurements for a more accurate number.

- Code the petri dishes according to type of sand:
  - 1-beach
  - 2-oolitic fine
  - 3-oolitic coarse
  - 4-salt flat sand
- Take 1 level teaspoon of each kind of sand and put in a petri dish.
- Add 10 ml of hot de-ionized water. Mix at least for 1 minute or until all the salt is dissolved.
- Using a pipette separate the salt water from the sand.
- Leave the water in the dish to evaporate for a few days.
- Weigh the salt that is left in the dish when the water has dried.

If a conductivity meter is available you can dilute 5 ml of salt water to 45 ml of deionized water, and use the meter to test salinity level.

Record results. Students should record results as they work on the experiment.

Make Conclusions: Students will make conclusions that reflect their hypothesis. Will they reject or accept their hypothesis?

### Closure:

As a class, consider the ecosystem of the Great Salt Lake, and draw conclusions why each soil contains the amount of salt that it does.

Ask the students if they have questions about sand or the salt that they would like to research. These ideas can be other topics in this unit.

### Assessment:

Students turn in lab notebooks. Check that students have made a hypothesis and written a conclusion about how their hypothesis was correct or how it differed based on the results of the experiment.

Check for level of thinking by asking questions during experimental time.