

Salt Water Race

Standard: 3240-01	Students will observe and describe chemical and physical change.	<i>Topic:</i> Chemical and Physical Change <i>Course:</i> #3240
Objective: 3240-0102	Analyze factors that influence chemical and physical change	
ILO's	2b Formulate research questions 2c Plan field studies 5e Solve problems	

Description of Activity

Title: Salt Water Race

Overview: Students will design and perform an experiment to dissolve salt in water in a as short a time as possible. They will utilize the materials provided to discover which physical changes are most effective.

Duration: 40-50 minutes

Materials: road salt, heat source, beakers of different size, stirring utensils, cloths, pie tins, crushing tools, goggles, very weak HCl.

Facilities: Lab room, especially if bunsen burners are used.

Background Information

Salt dissolves at a rate of 35g/100 ml water at room temperatures. Salt does not dissolve significantly better in warm water but crushing, stirring and having the largest possible amount of water to dissolve in do increase its' solubility.

Teaching and Learning Strategies

To ensure inquiry, students should not be coached as to what the materials should be used for. This may be difficult in the crushing step because students need to know how to safely crush something. The salt should be covered with the paper towel during this step. Instruction could be given when individual groups decide to use this step. Make sure some students receive beakers that are too small for all the salt to dissolve (100-150 ml). The weak hydrochloric acid has little or no affect.

Invitation to Learn

You may want to begin this activity by asking students to describe the solutions they are familiar with. Cooking, cleaning, and painting all involve the use of solutions. If they are unclear about what a solution is, this would be a good time to define and describe one. Then pose the question: How can you get salt to dissolve in the shortest amount of time possible?

Hand out the worksheet (see next page) and familiarize them with the materials available. Students should be in groups of between 2-4 students. Read the procedure with them, have them write their own procedures, gather their materials and wait for the class to be ready. You may want to check their procedures before you start.

Safe operating procedures include proper use of heat sources such as bunsen burners or hot plates. If students have not used these before, they should be instructed as to your expectations concerning their use and the location of fire extinguishing materials. Crushing the salt requires covering it and wearing safety goggles.

Summary of Learning

Multiple choice questions:

1. Crushing salt before dissolving it in water helps it to dissolve? Why?

- a. it exposes more of the salt to the water
- b. smaller pieces have less surface area
- c. large pieces sink to the bottom quicker
- d. water surrounds large pieces

answer: a

2. Which conditions would be more likely to encourage salt to dissolve quickly?

- a. lots of water, large chunks of salt, low temperature
- b. lots of water, small chunks of salt, high temperature
- c. little water, large chunks of salt, low temperature
- d. little water, small chunks of salt, high temperature

answer: b

Name _____

Title: Salt Water Race

Purpose: To see who can dissolve 50 grams of road salt the quickest.

Materials: 50 grams road salt, crushing tool (hammer, rock), alcohol burner or hot plate, 100 ml, 150ml, 200ml beakers, paper towels, pie tin, spoon, goggles, balance, acid, clock or stopwatch.

Prediction:

Procedure:

1. Measure out 50 grams of road salt.
2. Working with your group, decide how you want to dissolve your salt. Look at the equipment, if there is something else you want, ask for it. Write down the procedure your group will use in the space provided.
3. Collect the equipment you want to use but don't start.
4. When the signal is given, you may begin.
5. Raise your hands when your salt is all dissolved.

Our procedure:

Our time:

Analysis:

1. What procedures did the fastest group use?
2. Where could your group have improved?
3. Was this a chemical or physical change? Why?

Conclusion: