Session 3 (Group 1)

Killer Crystals

LEARNING OBJECTIVES:

Science Concepts & Practices:

In this unit students will...

- Simulate the threat to the young chicks of a salt crystal buildup
- Model the effects of human activity on groundwater
- Plan and carry out an investigation to reduce crystal buildup with fresh water
- Develop and describe a procedure for using a model within an investigation
- Ask questions and define problems

Language Skills & Knowledge:

In this unit students will...

- Explain findings

GLOSSARY WORDS IN SESSION 3:

habitat

impact

threat

ACTIVITY 1: REVIEW OF MATERIALS

Directions: Listen as your teacher explains the items that will be used In this investigation.

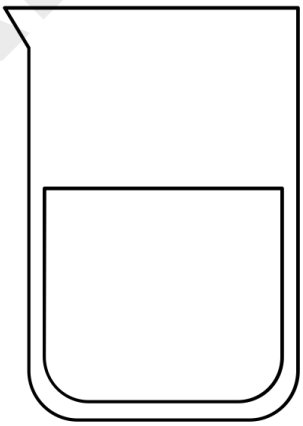
- ☐ Magnesium sulfate (Epsom salt)
- ☐ Very hot water
- ☐ 500 mL beaker or other heat-resistant container
- ☐ Stir stick
- ☐ Eyedropper
- ☐ Petri dish or other very shallow container

CAUTION!

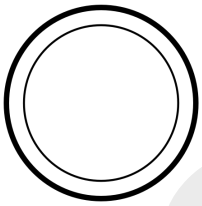
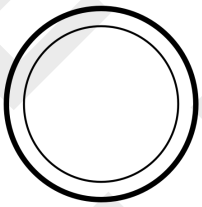
- → This investigation uses hot liquids.
- → Follow your class safety rules.
- → Wear goggles.
- → Wash hands thoroughly after the lab.

ACTIVITY 2: OBSERVE & RECORD CRYSTALLIZATION OF A SATURATED SOLUTION

Directions: Listen as your teacher reads the directions and carries out each step of the procedure. If you are conducting the procedure, after he or she models the step, conduct that step of the procedure, sketch what you observe and describe it in the notes column. If you are just observing, after your teacher models the step, sketch what you observe and describe it in the notes section.

		Sketch	Notes
	1. In the beaker, stir 1 cup of magnesium sulfate (Epsom salt) with 1/2 cup of very hot tap water for at least one minute. This creates a saturated solution. A saturated solution means no more salt can dissolve in the water. (Some undissolved crystals will be at the bottom of the glass.) 2. After stirring for one minute, observe the solution. Draw and describe it.	After stirring for one minute: 	

3. Use the eyedropper to coat the bottom of a petri dish with a thin layer of the hot solution. Make an observation immediately and describe it. Make an observation after 2 minutes. Make another observation after 3 minutes. Draw and describe your observations.

	Sketch	Notes
When added to petri dish:		
2 minutes later:		
3 minutes later:		

ACTIVITY 3: CONSIDER THE IMPLICATIONS OF RAPID CRYSTALLIZATION

Directions: Work individually or with a partner to discuss and answer the questions writing. Then, debrief as a class.

Remember a saturated solution means no more salt can dissolve in the water. How might a saturated solution like this pose a **threat** to flamingo chicks?

→ ***threat:*** *danger or something that may cause harm*

1. Does a saturated solution have a lot of salt in it or a little salt in it?

A saturated salt solution has a lot of salt/a little salt in it.

2. How might a saturated salt solution pose a threat to flamingo chicks?

A saturated salt solution might pose a threat to flamingo chicks because...

3. A saturated salt solution on the legs of flamingo chicks might be more dangerous than a salt buildup on the legs of adult flamingos. Why?

A saturated salt solution might be more dangerous to chicks because...

ACTIVITY 4: REVIEW THE PROBLEM & WRITE A HYPOTHESIS

4.1 Directions: Listen and follow along as your teacher reviews the problem at Lake Natron and introduces the investigation question. Then, debrief as a class.

Investigation Question:

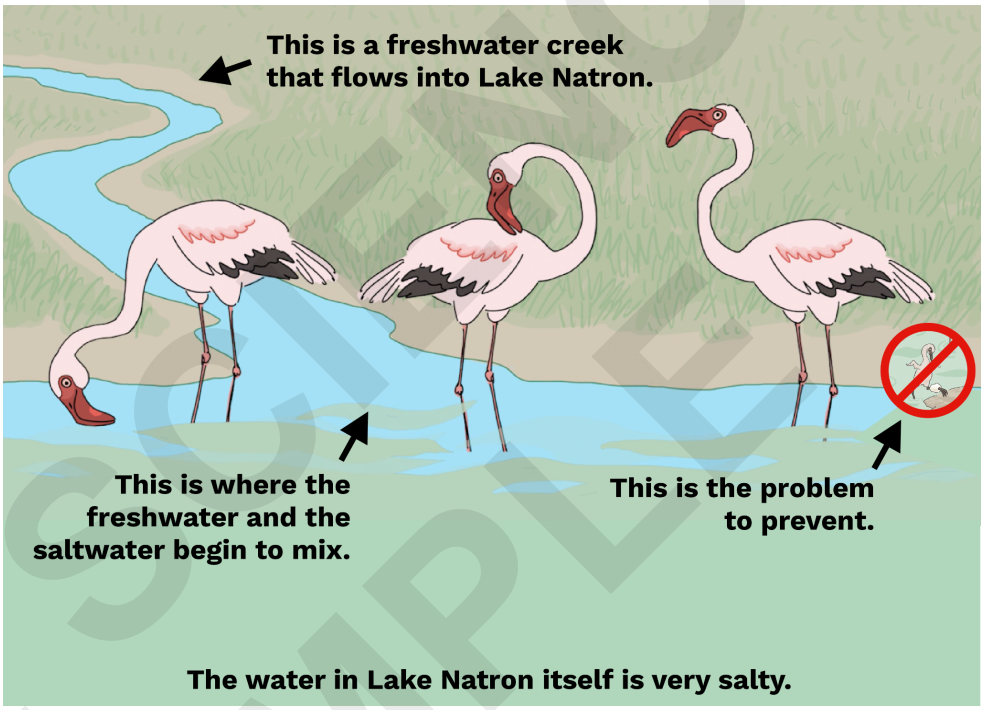
How can we use fresh water to prevent salt build-up on the legs of the flamingo chicks?

We learned in Session 2 that Lake Natron currently has saltwater and freshwater for the flamingos.

But, the government of Tanzania wants to build a soda ash factory that will *decrease* *(make smaller)* the amount of freshwater at Lake Natron.

If the flamingos only stand in salty water, heavy salt crystals will form on their legs.

The illustration to the right describes the problem at Lake Natron.



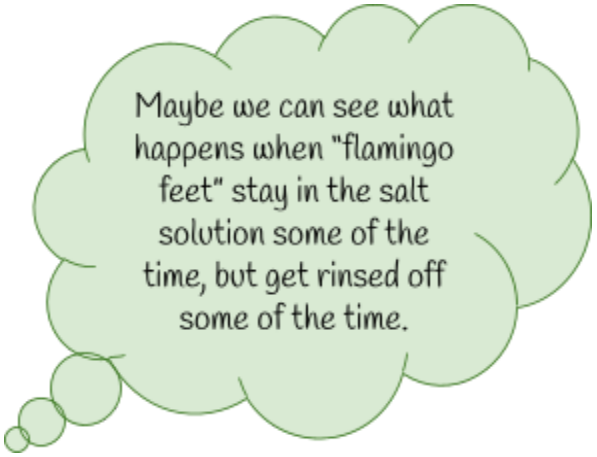
4.2 Directions: Listen and follow along as your teacher reviews one way to approach the investigation question. Work individually or with a partner to answer the question. Then, debrief as a class.

One way to approach the problem at Lake Natron is shown in the thought bubble to the right.

Maybe we can see what happens when flamingo feet stay in the salt solution some of the time, but get rinsed off some of the time.

1. ***What do you think will happen?***

I think...



4.3 Directions: Listen and follow along as your teacher reviews how to write a hypothesis. Work individually or with a partner to write a hypothesis based on the information in Activity 4.2. Then, debrief as a class.

A hypothesis is a possible explanation for a problem that can be tested by an experiment. A hypothesis is written as a statement that tells what you *predict (expect)* will happen. You might be able to come up with many hypotheses to answer a single question.

Write a hypothesis to test the approach in Activity 4.2. Use your answer to the question in 4.2 to help you.

Write your hypothesis as an "if-then" statement.

If flamingo legs stay in a salt solution, but are rinsed off in freshwater sometimes, then...

Writing a Hypothesis
If *[I do this]* _____, then *[this]* _____ will happen.
Example
If students study for 25 minutes per day, then they will do better on the test.

ACTIVITY 5: WRITE & CARRY OUT A PROCEDURE TO TEST YOUR HYPOTHESIS

5.1 Directions: Listen and follow along as your teacher reviews how to write a scientific procedure.

A well-written procedure should include detailed directions for each step. You want to be sure another person can read and follow your procedure.

The cartoon shows what can go wrong when a procedure is not *precise (specific)* enough.

Even simple procedures, like making a peanut butter sandwich, might include many steps.

When writing a procedure, remember to write specific and detailed directions for each step of the procedure. Include information about labeling and recording information. When possible, give units of measurement that are easy for others to understand. For example, *½ cup* instead of *some*.

1. ***Look at the cartoon above. What went wrong with this procedure?***

The problem with this procedure is...

INVESTIGATION: Killer Crystals

5.2 Directions: Work individually or with a partner to list out the steps of a procedure to test your hypothesis. First, write your hypothesis at the top of the worksheet. Then, list the steps of your procedure–include as few or as many steps as you need. Debrief as a class.

- Use the materials listed in the box below to test your hypothesis. Pipe cleaners should be used to simulate flamingo legs.
- **HINT:** Look at Activity 2: Step 1 for instructions on how to make a saturated salt solution

Hypothesis:

Procedure:

Step 1

Step 2

Step 3

Step 4

Step 5

Step 6

Step 7

Step 8

Step 9

Step 10

Materials:

- ☐ Magnesium sulfate (Epsom salt)
- ☐ Very hot water
- ☐ 250 mL beaker or other heat-resistant container
- ☐ Stir stick
- ☐ Eyedropper
- ☐ Petri dish or other very shallow container
- ☐ Pipe cleaners (or similar) to simulate flamingo legs

5.3 Directions: Listen and watch as your teacher carries out one (or more) of the procedures created by your class. Alternatively, work individually or with a partner to carry out the procedure you wrote in Activity 5.2. Record your observations through drawing or writing. Describe the results of the procedure(s) Then, debrief as a class.

Sketches	Notes	
	Hypothesis:	
	Observations:	
	Results:	
	Hypothesis:	
	Observations:	
	Results:	

ACTIVITY 6: ANALYZE & EXPLAIN YOUR FINDINGS

Directions: Analyze your findings by comparing your observations from the procedure with the hypothesis. Work individually or with a partner to write an explanation of your findings. Then, debrief as a class.

1. ***What was the hypothesis for the procedure you observed or carried out? If you observed more than one procedure, choose one and write the hypothesis below.***

2. ***Did the results of the procedure support the hypothesis? In your explanation, provide evidence or examples from the procedure. Then, explain your reasoning about why the evidence does or does not support the hypothesis.***

EXTENSION ACTIVITY: THINK OF A NEW INVESTIGATION QUESTION

Directions: Work individually or with a partner to think of another investigation question for the problem at Lake Natron and write a hypothesis.

1. ***What additional question would you want to investigate about Lake Natron and the impact of reducing the flow of freshwater to the flamingo's habitat.***

Another question I would want to investigate is...

EXAMPLE: What might happen to other animals in the habitat if they did not have sufficient fresh water? How might this affect the flamingos?

2. ***Write a hypothesis for an experiment that would address your investigation question. Remember, a hypothesis is written as a statement that tells what you predict (expect) will happen. Use the if-then format to write your hypothesis.***

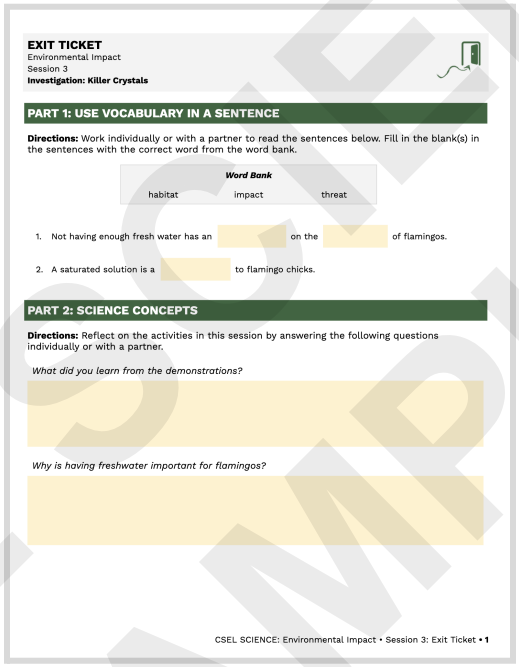
If _____, then _____.

EXIT TICKET

Directions: Before you leave class, complete the exit ticket and submit it to your teacher.

Find the exit ticket in Google Classroom.

Tip: Check to make sure the exit ticket looks like the images below.



EXIT TICKET
Environmental Impact
Session 3
Investigation: Killer Crystals

PART 1: USE VOCABULARY IN A SENTENCE

Directions: Work individually or with a partner to read the sentences below. Fill in the blank(s) in the sentences with the correct word from the word bank.

Word Bank

habitat impact threat

1. Not having enough fresh water has an _____ on the _____ of flamingos.
2. A saturated solution is a _____ to flamingo chicks.

PART 2: SCIENCE CONCEPTS

Directions: Reflect on the activities in this session by answering the following questions individually or with a partner.

What did you learn from the demonstrations?

Why is having freshwater important for flamingos?

CSEL SCIENCE: Environmental Impact • Session 3: Exit Ticket • 1