Cellular Process of Diffusion

Lesson Overview

In this lesson, students will explore the cellular process of diffusion. Prior to this lesson, students should have learned about plant and animal cell organelles and their functions. Students will complete a close reading of the diffusion lab and then conduct the experiment.

Standards Addressed

SC 2005	7-2.1 Summarize the structures and functions of the major components of plant and animal cells (including the cell wall, the cell membrane, the nucleus, chloroplasts, mitochondria, and vacuoles).
	7-2.2 Compare the major components of plant and animal cells.
SC 2014	7.L.3A.3 Develop and use models to explain how the relevant structures within cells (including cytoplasm, cell membrane, cell wall, nucleus, mitochondria, chloroplasts, lysosomes, and vacuoles) function to support the life of plant, animal, and bacterial cells.
	7.L.3A.2 Analyze and interpret data from observations to describe different types of cells and classify cells as plant, animal, protest, or bacteria.
CCSS ELA	RS-3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
NGSS	MS-LS1-2 Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

Disciplinary Literacy Best Practices

Concept Cartoon
Close Reading
Think-Ink-Pair-Share

Lesson Plan

Time Required: One 60-minute Class Period

Disciplinary Vocabulary: cell wall, cell membrane, nucleus, chloroplasts, mitochondria, organelles, vacuoles, function, structure

Materials Needed:

- Diffusion Lab Handout
- Cornstarch
- Iodine
- Water
- Zip Lock Bags
- Pipettes
- Beakers
- Plastic Spoons
- Measuring Cup

Assessment: Completed Diffusion Lab

Engage

- Students will react to the following concept cartoon:

Infer how far the scent from a skunk can travel. Have you ever been inside and smelled a skunk before and ran to another room of your house but could not smell it in that room? Infer how that happens.

Explore

- Students will Close Read the Diffusion Lab handout and discuss the steps of the lab with their partner. In Close Reading, text is read three times.
  - During the first reading, students will read the lab handout independently. Short "chunks" of text are read at a time, with the option of making individual annotations in the text.
  - During the second reading, students read collaboratively with a partner or small group. As they read, groups should highlight and annotate key ideas. Groups will then discuss the reading and determine the main idea for each section.
  - During the third reading, students take notes specifically on the main ideas identified during the second reading. Teacher will provide guiding questions for students to consider in comparison to the main ideas their group identified.
- Following close reading and discussion of the lab, students will complete the Diffusion Lab Activity.

Explain

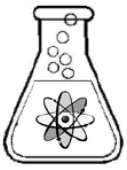
- Student pairs will join to make groups of four and use Think-Ink-Pair-Share to discuss thee lab activity, what results they got in their lab, and why as they answer the lab questions together.

Extend

- Students will complete a performance assessment task at the end of the unit.

Teacher Biographical Information

Tracy Glendening has a B.S. in Elementary Education from Lander University and is currently certified in Elementary Education and Middle School Science She has been teaching for 15 years and 13 of those years have been 7th Science at Saluda Middle School.



Name_____

Diffusion Lab

SAFETY NOTES

Goggles must be worn during this investigation.
Iodine is toxic and will make a permanent stain on your clothes.

Background Information:

Solution - a homogeneous mixture of two or more substances; a mixture of a solvent and a solute.
Solute - a substance that is dissolved in another substance, forming a solution.
Solvent - a substance that dissolves other substances, forming a solution.
Hypotonic - the solution on one side of a membrane where the solute concentration is less than on the other side.
Hypertonic - the solution on one side of a membrane where the solute concentration is greater than on the other side.
Concentration gradient - change in the concentration of a substance from one area to another.
Diffusion - the movement of a substance from an area of high concentration to an area of low concentration. The process tends to distribute the particles more evenly.
Osmosis - the diffusion of water through a selectively permeable membrane
Selectively permeable -a barrier that allows some chemicals to pass but not others
Indicator - a substance that chances color in the presence of the substance it indicates.

Purpose: In this lab you will observe the diffusion of a substance across a selectively permeable membrane.

Materials:

Plastic bag	Spoon	Corn starch
Iodine or Lugol's Solution	Beaker	Water
Apron	Goggles	Eyedropper

Procedure:

1. Fill a plastic baggie with a teaspoon of corn starch and a half a cup of water tie bag.
2. Fill a beaker halfway with water and add ten drops of iodine.
3. Place the baggie in the cup so that the cornstarch mixture is submerged in the iodine water mixture.
4. Wait fifteen minutes and record your observations in the data table
5. While you are waiting, answer the questions.

Data:

	Starting Color	Color after 15 minutes
Solution in Beaker		
Solution in Bag		

Data Analysis

1. Based on your observations, which substance moved, the iodine or the starch?

2. How did you determine this?

3. The plastic baggie was permeable to which substance?

4. Is the plastic baggie selectively permeable?

5. Sketch the cup and baggie in the space below. Use arrows to illustrate how diffusion occurred in this lab.

Adapted from an activity by found at http://www.biologycorner.com/
M. Poarch – 2005
http:science-class.net

Conclusion Questions:

1. Define diffusion.

2. Define osmosis

3. What is the main difference between osmosis and diffusion?

4. Why is iodine called an indicator?

5. Molecules tend to move from areas of _____ concentration to areas of _____ concentration.

6. Is the baggie or beaker more concentrated in starch?

7. Is the baggie or beaker more concentrated in iodine?

8. Iodine solution: is the baggie or the beaker hypertonic?

9. Starch solution: is the baggie or the beaker hypertonic?

10. Which one is hypotonic in relation to starch, baggie or beaker?

Expansion - Make Some Predictions

11. If the baggie was permeable to starch, which way would the starch move, into the bag or out of the bag? Explain your answer.

12. If the baggie was permeable to iodine, which way would the iodine move, into or out of the bag? Explain your answer.

13. If the baggie was permeable to iodine, what color would you expect the solution in the baggie to turn? Explain your answer. What about the solution in the beaker? Explain your answer.

14. If the baggie was permeable to starch, what color would you expect the solution in the baggie to turn? Explain your answer. What about the solution in the beaker? Explain your answer.

15. Make a prediction about what you think will happen if you did an experiment in which the iodine solution was placed in the baggie, and the starch solution was in the beaker? Be **detailed** in your description.

Performance Task

Summative Assessment

Name:_____

Total Possible Points:____4_____

Total Points Earned:_____

The skin of a grape is a selectively permeable membrane. Infer what would happen if you placed the grape in a glass of water. Explain what cellular process(s) would take place and be sure to include evidence and appropriate vocabulary to support your claim.

Rubric

The response will be assessed based on the following rubric.

3 Points	The response gives sufficient evidence of the ability to use evidence and appropriate terminology to support inferences.	1 Point	The response uses appropriate conventions.
2	The response gives limited evidence of the ability to use evidence and appropriate terminology to support inferences.	0	The response does not use appropriate conventions.
1	The response gives some evidence of the ability to use evidence and appropriate terminology to support inferences.		
0	The response gets no credit if it does not provide evidence and appropriate terminology.		