Lesson 3 – Mixtures and Solutions

Who
This lesson is designed for fifth graders ranging in age from nine to eleven.

What
This lesson is part of the Physical Science Unit of Instruction and based on California State Standards.

How Long
This lesson will take place during two 75 minutes sessions.

Description
In this lesson the learners will:
• Know sometimes elements and compounds are mixed together but not chemically combined;
• know mixtures can often be separated by using physical properties;
• know a solution is a special mixture in which a substance is dissolved.

California State Content Standards Covered in this Lesson
5PS1.f Students know differences in chemical and physical properties of substances are used to separate mixtures and identify compounds.

National Educational Technology Standards for Learners
1. Basic Operations and Concepts – Students a. demonstrate a sound understanding of the nature and operation of technology systems.

3. Technology Productivity Tools – Students a. use technology to enhance learning, increase productivity, and promote creativity. b. use productivity tools to collaborate in constructing technology-enhanced models, preparing publications, and producing other creative works.

Instructional Objectives

• Students design ways to separate simple mixtures.

Instructional Procedures

Lesson Set
This unit will be introduced by presenting a guided inquiry. A sand bucket filled with sand, salt, iron shavings and water will be shown to the students. Also an
aspirin will be dropped into a glass of lemonade. Students will be asked if they think it is possible to separate the contents of either container. Students will discuss in small groups if they think separating the contents is possible and why.

The students will receive a handout with the list of goals written in the form of questions for this unit.

The students will be asked the following scaffolding questions:
   1. What is the word for a substance that dissolves?
   2. How are elements, compounds, and mixtures different?
   3. Why is solubility a physical property if the solute seems to disappear?

Techniques and Activities

Students will buddy read with their shoulder partner pages 26 through 29 in the Science textbook. They will discuss the pictures of the mixtures on page 26 and how physical properties can help separate the parts of the mixture. They will discuss the picture of the solution on page 28 and discuss how a solution is different than a mixture.

The class will review whole group the definition of a mixture. The class will determine if table salt and sugar are mixed together what the physical properties are of the mixture and if this mixture can be separated easily.

Students will complete the Lesson 4 worksheet (from Scott Foresman and reproduced at the end of this lesson) after they read through Lesson Four.

Lesson Closure

Students will work in small group to separate the mixture of sand, salt, iron shavings, and water using what they have learned about physical properties.

Students will write a concluding paragraph that summarizes the main ideas in Lesson 4. Remind students to list specifically mixture and solution and to include supporting details when writing their concluding paragraph.

Adaptations for Special Learners

Have students preview the title and headings on the pages. Display how to make a skeleton outline for the section. Write the lesson titles as major divisions and subheadings at the next level.

Model how to fill in the main idea and details under each heading.
After students have completed each lesson, review it as a class to make sure they have included all vocabulary definitions and key concepts.

**Supplemental Activities**
Students will create two slides using Pixie software. The first will be of a mixture and the second of a solution. Each slide will contain a summary paragraph and illustration. At the end of this unit the slides will be turned into a movie.

**Assessment**
Formal Evaluation
- Lesson Four Quiz *(from Scott Foresman and reproduced at the end of this lesson)*
- Written Concluding Paragraph
- Pixie slides

Informal Evaluation
- Artifacts created on the Extra tab
- Observation of how well students read with shoulder buddy

**Learner Products**
- Pixie Slides
- Extra Artifacts
How can we separate mixtures?
Read each list. Then write a statement to tell what the list describes.

1. take carrots out of a soup
2. use a filter to remove sand from water
3. use a magnet to attract metals

1. Solvent dissolves a substance. Water is a solvent.
2. Solute is the substance dissolved. Sugar is a solute.

1. made of only one kind of atom
2. have a chemical symbol
3. can’t be divided into simpler substances

1. made of two or more elements
2. have a chemical formula
3. can be broken down into simpler substances

1. made of two or more substances
2. do not have a chemical symbol or formula
3. can be separated by physical means

**Notes for Home:** Your child identified what list items have in common. Give your child a mixture of plastic and metal paper clips and a magnet. Have your child show how to separate the paper clips.
Reviewing Terms: Matching

Match each term with the correct definition. Write the letter on the line next to the term.

1. mixture
2. solute
3. solvent
4. solution

- a. different substances placed together that are spread out evenly
- b. substance in which a different substance is dissolved
- c. different materials placed together that are not chemically combined
- d. substance that is dissolved in another substance

Reviewing Concepts: Sentence Completion

Complete each sentence with the correct word or phrase.

5. Salt water is an example of a _____ (compound, mixture)

6. A _____ solution has a large amount of solute for the amount of solvent. (dilute, concentrated)

7. Chromotography can be used to _____ substances. (identify, dissolve)

8. The compounds in a _____ are not chemically combined. (solute, mixture)

Applying Concepts

Use complete sentences to answer the question.

9. Explain how you would separate a mixture of water, sand, salt, and iron filings into its four component parts. (2 points)

- Stir the mixture so the salt dissolves in the water.
- Let the sand and iron filings settle to the bottom and pour off the salt water.
- Evaporate the water from the salt water so that only the salt is left.
- Use a magnet to separate the iron filings from the sand.
Reviewing Terms: Matching
Match each term with the correct definition. Write the letter on the line next to the term.

<table>
<thead>
<tr>
<th></th>
<th>1. mixture</th>
<th>2. solute</th>
<th>3. solvent</th>
<th>4. solution</th>
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<td>c</td>
<td>a. different substances placed together that are spread out evenly</td>
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<td>d</td>
<td>b. substance in which a different substance is dissolved</td>
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</tbody>
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Reviewing Concepts: Sentence Completion
Complete each sentence with the correct word or phrase.

5. Salt water is an example of a [compound, mixture].
6. A [dilute, concentrated] solution has a large amount of solute for the amount of solvent.
7. Chromatography can be used to [identify, dissolve] substances.
8. The compounds in a [identify, dissolve] mixture are not chemically combined.

Applying Concepts
Use complete sentences to answer the question.

9. Explain how you would separate a mixture of water, sand, salt, and iron filings into its four component parts. (2 points)

   **Stir the mixture so the salt dissolves in the water. Let the sand and iron filings settle to the bottom and pour off the salt water. Evaporate the water from the salt water so that only the salt is left. Use a magnet to separate the iron filings from the sand.**