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DepED
DEPARTMENT OF EDUCATION

# Lesson Exemplar for Science

Quarter 1

Week

7



DepED MATATAG
BAGONG PILIPINAS
ONE NCR STRONGER TOGETHER

**Lesson Exemplar for Science Grade 7**
**Quarter 1: Week 7**

This material is intended exclusively for the use of teachers in the implementation of the MATATAG K to 10 Curriculum. It aims to assist in delivering the curriculum content, standards, and lesson competencies.



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| **MATATAG**<br>**K to 10 Curriculum**<br>**Weekly Lesson Log** | School | | Grade Level | |
| | Name of Teacher | | Learning Area | |
| | Teaching Dates and Time | | Quarter | |

| | DAY 1 | DAY 2 | DAY 3 | DAY 4 |
|---|---|---|---|---|
| **I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES** | | | | |
| A. *Content Standards* | The properties of solutions, such as solubility and reaction to litmus, determine their use. | | | |
| B. *Performance Standards* | By the end of the Quarter, learners recognize that scientists use models to describe the particle model of matter. They use diagrams and illustrations to explain the motion and arrangement of particles during changes of state. They demonstrate an understanding of the role of solute and solvent in solutions and the factors that affect solubility. They demonstrate skills to plan and conduct a scientific investigation making accurate measurements and using standard units. | | | |
| C. *Learning Competencies* | Identify the role of solute and solvent in solution. | Identify the role of solute and solvent in solution. | express quantitatively the amount of solute present in a given volume of solvent. | express quantitatively the amount of solute present in a given volume of solvent |
| D. *Learning Objectives* | At the end of the lesson, the learners shall be able to:<br>a. identify the degree of solubility of the solute and solvent in forming solutions;<br>b. perform investigations on different solutes that can be dissolved in a given solvent (e.g., water, oil, etc.); and<br>c. practice safe handling of materials while performing their experiment. | At the end of the lesson, the learners should be able to:<br>a. identify how solute and solvent affect the solubility in the solution<br>b. differentiate dissolving from melting, and<br>c. explain the factor/s affecting the dissolving and melting of materials | At the end of the lesson, the learners should be able to:<br>a. differentiate between percent by mass and percent by volume;<br>b. calculate percentage composition by mass/by volume of a given solution, and<br>c. discuss how knowledge of percentage composition is important to daily life. | At the end of the lesson, the learners shall be able to:<br>a. differentiate the three types of solutions as saturated, unsaturated, and supersaturated<br>b. identify the types of solution based on the amount of solute and solvent in a solution (unsaturated, saturated and supersaturated solutions)<br>c. predict the type of solution formed based on the amount of solute and solvent present in a solution using the solubility curve |



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| *Instructional Design Framework* | Collaboration, Creativity, Experience, Integrative | Collaboration, Explore, Ideational | Context, Engage, Integrative | Context, Reflective thinking, Ideational |
| *21st Century Skills* | Creativity, Critical thinking, reflective thinking, teamwork, collaboration, self-discipline, non-verbal communication | Visual literacy, critical thinking, interpersonal skills, teamwork, resilience and adversity management | Critical thinking, problem solving, reflective thinking | Critical thinking, collaboration, problem-solving |
| **II. CONTENT** | Investigating different solutes that can be dissolved in a given solvent | Dissolving vs. Melting | Percentage Composition | Saturated, Unsaturated, Supersaturated solutions |
| **III. LEARNING RESOURCES** | | | | |
| *A. References* | Raymond Chang et al Chemistry (12th ed 2016) pp-506-547 | Theodore Brown et al Chemistry: The Central Science (14th ed 2017) pp 520-570 | Theodore Brown et al Chemistry: The Central Science (14th ed 2017) pp 520-570 | Raymond Chang et al Chemistry (12th ed 2016) pp-506-547 |
| *B. Other Learning Resources* | | | https://www.tensens.com.au/TBLABELBLEACH4/True-Blue-Labels-Bleach-4%25-Chlorine/pd.php | https://chem.libretexts.org/Bookshelves/Introductory_Chemistry/Chemistry_for_Allied_Health_(Soult)/07%3A_Solids_Liquids_and_Gases/7.07%3A_Solubility |
| **IV. TEACHING AND LEARNING PROCEDURES** | | | | |
| **Before/Pre-Lesson Proper** | | | | |
| *Activating Prior Knowledge* | **Matching Type:**<br>Match Column A with Column B<br><br>**Column A**<br>1. soft drinks<br>2. seawater<br>3. bronze<br>4. gasoline<br>5. air<br><br>**Column B**<br>a. solid in solid<br>b. liquid in a liquid<br>c. gas in a gas<br>d. gas in a liquid | **Activity 2.1 THINK-PAIR-SHARE**<br><br>Present to students the scenario below:<br><br>**SCENARIO 1**<br>Students placed sugar into a cup of tea. They observed it until the sugar cubes were no longer visible. | Let's recall your understanding of concepts in the solution by completing the table below.<br><br>Identify the solute and the solvent in the following solutions. | **PRE-ASSESSMENT**<br>1. We can say that a solution is diluted when<br>***A. the concentration of the solute decreases***<br>B. the concentration of the solvent increases<br>C. the volume of the solution decreases<br>D. the mass of the solute remains constant |



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e. solid in liquid

Answer:
***1. d***
***2. e***
***3. a***
***4. b***
***5. c***

**SCENARIO 2**
Another group of students observed ice in a glass placed on top of the table. They observed it until the ice changed from solid to liquid and completely melted.

**GUIDE QUESTIONS:**
1. What caused the sugar cubes to disappear?
2. What caused the ice to liquify or melt?
3. How does temperature affect the change of sugar to disappear and ice to melt?
4. What happens to the kinetic energy of solid sugar as it dissolves in a cup of tea?
5. How does temperature affect the kinetic energy of ice as it melts and liquifies?
6. Why does dissolving and melting happen in different materials such as in sugar dissolved in cup of tea and melting of ice?

*Possible Answers:*
1. *The hot temperature of the tea caused the sugar cubes to be dissolved in the tea.*

| Solution | Solute | Solvent |
|---|---|---|
| 1. Ocean water Components: salt and water | | |
| 2. Air Components: nitrogen and oxygen | | |
| 3. Gold Jewelry Components: gold and copper | | |

2. What happens to the concentration of a solution when more solute is added?
***A. the concentration increases***
B. the concentration decreases
C. the concentration remains the same
D. the concentration doubles

3. In a diluted solution, there is _____.
A. no solvent
B. no solute
C. small amount of solvent
***D. a large amount of solvent***

4. What does NOT change when adding solvent dilutes a solution?
A. volume of solvent
B. mass of solvent
***C. mass of solute***
D. concentration of the solution

5. Which of the following refers to the solution that contains less solute than can dissolve at a given temperature?
A. solubility
B. dilute solution
C. saturated solution
D. ***unsaturated solution***



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| | | 2. *The hot temperature of the surrounding caused the ice in a glass to melt.*<br>3. *The higher the temperature the faster it is for the sugar cubes to be dissolved and the ice to melt.*<br>4. *The kinetic energy of solid sugar increases as the temperature increases causing it to disappear and be dissolved in the liquid faster.*<br>5. *The solid ice cubes absorb energy causing its kinetic energy to increase and change its form from solid to liquid known as melting.*<br>6. *Dissolving and melting happens when there is an increase in the temperature of the materials present in a solution.* | | |
| *Lesson Purpose/ Intention* | The students will unlock the vocabulary words through a game called "*Wika Rambulan.*"<br><br>***Direction***: By saying/pronouncing and connecting the Set of | In our lesson today, we'll explore two fundamental processes: melting and dissolving. Melting, as many of you may already know, is when a solid substance transforms into a liquid state due to an | **Percent Concentration**<br><br>The concentration of a solution is a measure of how much a particular substance is dissolved in a solution. In particular, it is the amount of solute | **DISSOLVED OR NOT DISSOLVED:**<br>If 36.40 grams of salt can be dissolved completely in 100 mL of water at 40°C, what do you think will happen if you mix 50 grams of salt to 100 mL of water at the same temperature? |



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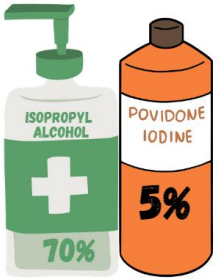
| | Words, reveal the hidden term.<br><br>**Words to unlock:**<br>1. solution – **SAWLOOSHONE**<br>2. nature – **NAYCHORE**<br>3. soluble - **SOULLOOBALL**<br>4. insoluble- **INNSOULLOOBALL**<br>5. solubility-**SAAL-YUH-BI-LUH-TEE** | increase in temperature. This process is not just about ice turning into water; it's the key to understanding how materials behave under different conditions.<br><br>On the other hand, dissolving is a phenomenon that happens all around us, from sugar dissolving in your morning coffee to salt disappearing into a pot of boiling water. But why do some substances dissolve while others don't? What factors influence this process? These are the questions we'll unravel together.<br><br>By understanding melting and dissolving, we gain insights into essential scientific concepts and their real-world applications. From cooking to manufacturing to environmental processes, these phenomena play crucial roles in shaping our daily experiences and the world around us. | dissolved in a given amount of solution.<br><br>You can see from the following examples the concentration written on the label.<br><br>  <br><br><br>Concentrations of solutions can also be expressed quantitatively:<br>(1) percent by mass and (2) percent by volume. Percent (%) means parts per hundred<br>parts. The table shows the mathematical equation of expressing concentrations of solutions quantitatively.<br><br>**Percent Concentration**<br><br>| Percent concentration | Equation |<br>\|---\|---\|<br>\| Percent by mass \| $\frac{\text{mass of solute (g)}}{\text{mass of solution (g)}} \times 100$ \|<br>\| Percent by volume \| $\frac{\text{Volume of solute (mL)}}{\text{Volume of solution(mL)}} \times 100$ \| | This lesson will explain to the students the concept of solubility showing the relationship of the mass of solute to the given amount of solvent at a particular temperature.<br><br>**Source:**<br>https://chem.libretexts.org/Bookshelves/Introductory_Chemistry/Chemistry_for_Allied_Health_(Soult)/07%3A_Solids_Liquids_and_Gases/7.07%3A_Solubility |



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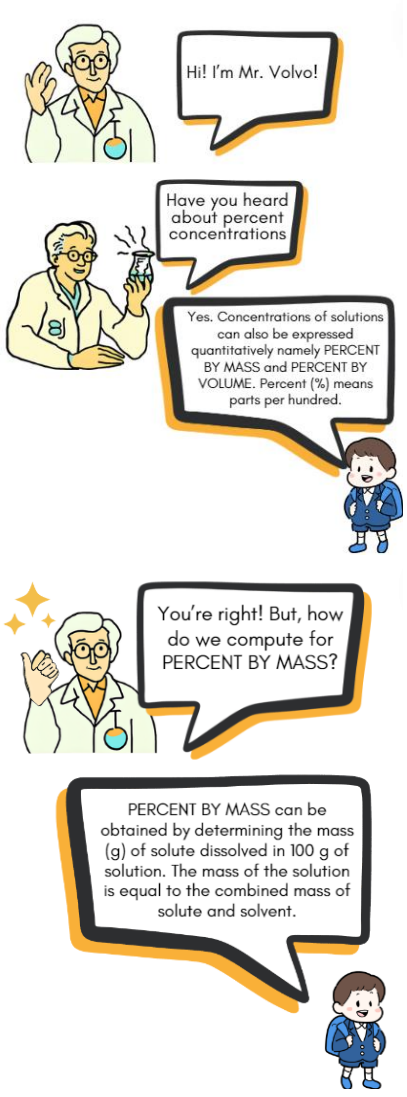
| *Lesson Language Practice* | From the words unlocked by the students, they will share their definitions of the following words.<br>1. solution - a homogeneous mixture composed of solute and solvent.<br>2. nature - a characteristic or property.<br>3. soluble – able to dissolve<br>4. insoluble – cannot be dissolved<br>5. solubility-ability to be dissolved | Let students read the following keywords about dissolving and let them try to use each word in a sentence.<br>• Solute<br>• Solvent<br>• Solution<br>• Soluble<br>• Insoluble<br>• Intermolecular forces | Read the comic strip and answer the questions below.<br>  | **RUMBLE SCRAMBLE**<br><br>Directions: Unscramble the word based on the definition given below. Write your answer in the space provided.<br><br>1. **lulitysobi** - The ability of a given substance to dissolve a solute in a solvent.<br>***solubility***<br>2. **teurasatd** – A solution that contains the maximum amount of solute that is capable of being dissolved.<br>***saturated***<br>3. **atsautnured** – It has lesser solute that doesn't achieve the maximum capacity of solvent to dissolve in a solution.<br>***unsaturated***<br>4. **pseursteurasatd** – A solution exceeds the maximum amount of solute that a solution can hold. Crystallization may form in this type of solution.<br>***supersaturated*** |



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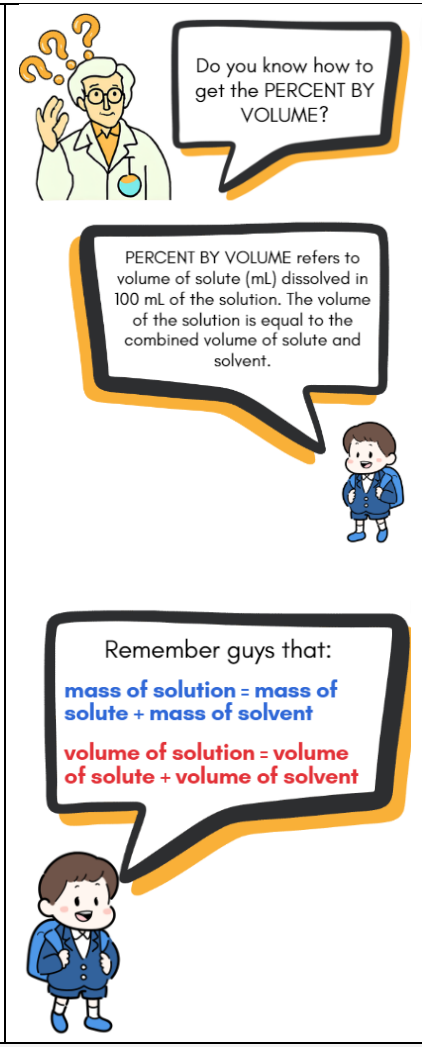
| | | |  | |
| **During/Lesson Proper** | | | | |
| *Reading the Key Idea/ Stem* | **Activity 1.1: Nature of Solute and Solvent**<br>The learners will be given a reading passage about the nature of solute and solvents. | **Activity 2.2 Melting and Dissolving**<br>Ask students to look at the particle box below to differentiate melting from dissolving. | The learners will be given a reading passage about the concentration of solutions<br>**Activity 3.1 Concentration of Solutions** | Provide the learners with the reading material.<br>**Activity 4.1 *Lily and Her Candies*** |



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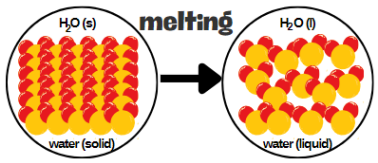
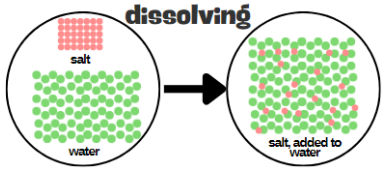
| | Solutes are considered soluble in the given solvent if they dissolve easily because of their similar nature. Examples are sugar being dissolved in water and salt being mixed with water to form a brine solution. On the other hand, insoluble solutes are those that do not dissolve in the solvent because of the differences in their nature. For example, butter is insoluble in water.<br><br>When the two substances are both liquids, the terms miscible and immiscible are used instead. | A. MELTING<br><br>  <br><br><br>B. DISSOLVING<br><br>  <br><br><br>1. How are the particles of melting substances from A different from dissolving substances from B?<br><br>2. What happened to the number of salt particles and the number of water particles when salt dissolved in water?<br><br>Did the particles of salt become smaller or loose as shown in the particle box? Explain. | The concentration of a given solution is described as the measure of the relative amount of solute and solvent it contains. Qualitatively, solutions can be described as diluted or concentrated. A solution is **concentrated** if it contains a relatively large amount of solute in a given volume of solution. A **diluted** solution, on the other hand, contains a relatively small amount of solute. The strong scent of perfume and the sweet taste of fruit juice are some examples of highly concentrated solutions. The measure of the amount of solute that has been dissolved in a given amount of solvent or solution is called the concentration of solution.<br><br>How the concentration is measured or described for a solution depends on the nature of the solutes in the solution and the applications and uses of the solution. The simplest concentrations we see are those listed on the bottles of household chemicals that come in different strengths. These are | Once upon a time, in a bustling kitchen, there was a young chef named Lily, eager to master the art of candy-making for the village fair.<br><br>One sunny afternoon, Lily decided to make lemon-flavored lollipops. She heated water in a pot, adding sugar until it dissolved completely. "This is an unsaturated solution," she thought, noticing there was room for more sugar.<br><br>With a mischievous grin, Lily added more sugar until the water was saturated. She poured the mixture into molds, creating sweet lollipops.<br><br>But Lily wasn't done experimenting. She tried making rock candy, heating water, and adding even more sugar. "This is a supersaturated solution," she exclaimed as she watched the sugar dissolve.<br><br>Excited, Lily poured the solution into jars and hung sticks in it. As it cooled, excess sugar crystallized, |



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| | | | usually given as percentages.<br><br>If we were to look in the bathroom or kitchen of our house, we would probably find a bottle of peroxide for disinfecting bleach for cleaning that has a percentage labeled prominently on the front of the bottle. This percentage is a form of quantitative description of concentration that tells how strong that peroxide or bleach solution is. Most household bleaches are labeled 5%. This means if we were to measure out 100 grams of bleach, 5% or 5 grams of that would be the solute, the pure bleach, or sodium hypochlorite. To account for this percentage by mass,<br><br>% mass = $\frac{mass\ of\ solute}{mass\ of\ solutions}$ x 100<br><br>When two liquids are mixed, the calculation is a bit different. This is called a volume/volume or (v/v) percent solution, which means that it is the volume of the solute in the volume | forming beautiful rock candy. |



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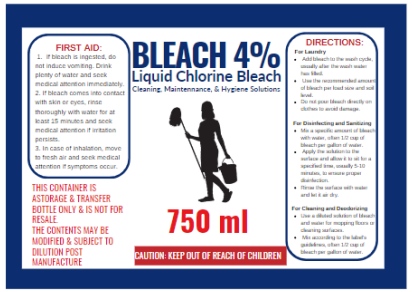
| | | | of the solution. The peroxide we find in our bathroom in a brown bottle is usually a 3% (v/v) solution, which means if we poured out 100 milliliters of it, it would contain about 3 milliliters of liquid hydrogen peroxide, with the remainder being the water solvent. Below is the formula for solving for percentage by volume<br><br>% by volume $= \frac{volume\ of\ solute}{volume\ of\ solution}$ x 100<br><br>  | |
| *Developing Understanding of the Key Idea/ Stem* | **Guide questions:**<br><br>1. Differentiate between soluble and insoluble/ miscible and immiscible. Support your answer with examples.<br><br>2. Does the nature of solute and solvent affect their | The table below will help you understand the difference between melting and dissolving.<br><br>**MELTING** \| **DISSOLVING**<br>Liquid is the same substance as the solid \| Additional substance is needed (the solvent) is needed. | Answer the questions below.<br><br>1. When do we use mass percent (m/m %) or volume percent (v/v %)?<br><br>2. How are the formula used to solve for percentage | **Guide Questions:**<br><br>1. What are the 3 types of solutions formed by Lily in her candy making?<br><br>2. How did she describe each? |



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solubility? Explain your answer.

The students will test the solubility of the given solutes and solvents and share their observations in class. Questions are given to be answered after the activity.

**Activity 1.2: Will the Solutes Dissolve?**

1. Each group will be provided with a set of materials to test whether each pair of substances are soluble or not.
2. Write your predictions in the data table before experimenting.
3. Perform the experiment and record your answers in the data table provided below.

| Materials | Prediction | Observation | Result |
|---|---|---|---|
| | Will it dissolve? Yes or No | What does the solution like? | Did it dissolve? Yes or No |
| sugar and water | | | |
| sugar and oil | | | |
| flour and water | | | |
| flour and oil | | | |
| salt and water | | | |

| | |
|---|---|
| Not all solids melt on heating (They may burn or decompose) | This can involve chemical changes |
| Only one substance is involved | Involves two materials and the resulting solution is a mixture of both. |
| Heat is needed for melting to occur | The dissolved substance is still present in the solution even though it can't be seen. |

by mass and percentage by volume different?

3.What other examples of materials can be found at home that show percentage composition in their label?

3. What do you consider in determining the type of solution?

**Study the table below and answer the following questions.**

NOTE: 36 grams of table salt will form a saturated solution in 100 mL of water at 25°C.

| | Amount of Salt (grams) | Amount of Water (mL) | Temperature (°C) |
|---|---|---|---|
| A | 20 | 100 | 25°C |
| B | 36 | 100 | 25°C |
| C | 70 | 100 | 25°C |

1. Identify the type of solution formed in each situation.
**A unsaturated**
**B saturated**
**C supersaturated**

2. From your answer, how many grams of solute is the excess of a supersaturated solution?
**34 grams**

3. How many grams of solute should be added to an unsaturated solution to make it saturated?
**16 grams**



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| | **<u>Group No. 1</u>**<br><br>**Materials:**<br>clear plastic cups/clear glass, spoon, sugar, water, cooking oil<br><br>**Procedure:**<br>**Setup 1:**<br>1. Put one teaspoon of sugar in a ½ cup of water.<br>2. Use the spoon to mix the sugar and water.<br>3. Record your observations.<br><br>**Setup 2:**<br>1. Put one teaspoon of sugar in a ½ cup of cooking oil.<br>2. Use the spoon to mix the sugar and oil.<br>4. Record your observations.<br><br>**<u>Group No. 2</u>**<br><br>**Materials:**<br>Clear plastic cups/clear glass, spoon, flour, water, cooking oil<br><br>**Procedure:**<br>**Setup 1:**<br>1. Put one teaspoon of flour in a ½ cup of water. | | | |



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| | 2. Use the spoon to mix the flour and water.<br>3. Record your observations.<br><br>**Setup 2:**<br>1. Put one teaspoon of flour in a ½ cup of cooking oil.<br>2. Use the spoon to mix the flour and cooking oil.<br>3. Record your observations.<br><br>**<u>Group No. 3</u>**<br><br>**Materials:**<br>clear plastic cups/clear glass, spoon, salt, water, cooking oil<br><br>**Procedure:**<br><br>**Setup 1:**<br>1. Put one teaspoon of salt in a ½ cup of water.<br>2. Use the spoon to mix the salt and water.<br>3. Record your observations.<br><br>**Setup 2:**<br>1. Put one teaspoon of salt in a ½ cup of cooking oil. | | | |



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| | 2. Use the spoon to mix the salt and cooking oil.<br>3. Record your observations.<br><br>**<u>Group No. 4</u>**<br><br>**Materials:**<br>clear plastic cups/clear glass, graduated cylinder or any measuring cup, rubbing alcohol, water, cooking oil<br><br>**Procedure:**<br>**Set Up 1**<br>1. Using the graduated cylinder, measure 10 mL of rubbing alcohol and 10 mL of water, respectively.<br>2. Pour the two liquids into the plastic cup.<br>3. Use the spoon to mix the alcohol with water.<br>4. Record your observations.<br><br>**Set Up 2**<br>1. Using the graduated cylinder, measure 10 mL of water and 10 mL of cooking oil, respectively. | | | |



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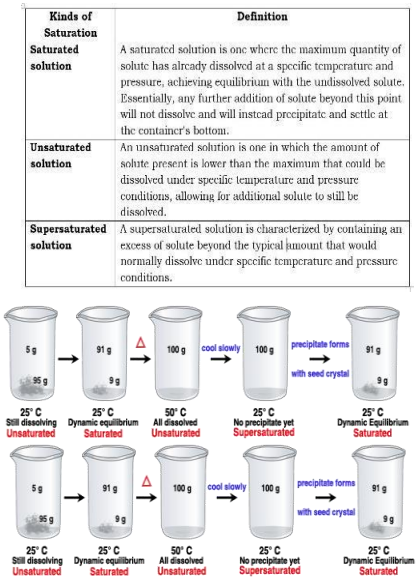
| | 2. Pour the two liquids into the plastic cup.<br>3. Use the spoon to mix the water and cooking oil.<br>4. Record your observations. | | | |
| *Deepening Understanding of the Key Idea/ Stem* | After their group activity, the students will share their ideas by answering the following questions below:<br><br>1. Which of the solute-solvent combinations you observed are soluble/miscible? What made you say that the solute is soluble/miscible in the solution? Is the same with your predictions?<br><br>2. Which of the solute-solvent combinations you observed are insoluble/immiscible? What made you say that the solute is insoluble/immiscible in the solution? Is the same with your predictions?<br><br>3. From the results of your experiment, differentiate soluble from | **Activity 2.2.1**<br>Identify if the following shows dissolving or melting.<br>1. cotton candy in the mouth<br>2. crushed medicine tablet in water<br>3. chocolate bar under the heat of the sun<br>4. sugar cube in coffee<br>5. butter on a plate | **Percent by mass** can be obtained by determining the mass (g) of solute dissolved in 100 g of solution. The mass of the solution is equal to the combined mass of the solute and solvent.<br><br>***mass of solution = mass of solute + mass of solvent***<br><br>**Sample Problem:**<br>You are preparing a solution at home containing 5 grams of salt in 100 grams of water. What is the mass percent of the solution you prepared?<br><br>*% by mass = [mass of solute (g)/ mass of solution (g) x 100]*<br><br>***%** by mass = 5 g / (5g +100) x 100*<br>***Answer** = 4.76 %* | Learners form groups and analyze the scenario below.<br>  <br><br><br>For example, the solubility of glucose at 25 °C is 91 g/100 mL of water. The solubility at 50 °C is 244 g/100 mL of water.<br><br>If we add 100 g of glucose to 100 mL water at 25 °C, 91 g dissolve. Nine grams of |



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| | insoluble, and miscible from immiscible. | | **Percent by volume** refers to the volume of solute (mL) dissolved in 100 mL of solution. The volume is equal to the combined volume of solute and solvent.<br><br>***Volume of solution = volume of solute + volume of solvent***<br><br>**Sample Problem:**<br>While using alcohol to disinfect your hands, you notice the label written as 70% isopropyl alcohol. Your mother explained that 70 mL of alcohol is mixed with water to produce 100 mL of solution. If you mix 90 mL of alcohol in 150 mL of solution, what is the % by volume produced?<br><br>*% by volume = [volume of solute (mL) / volume of solution (mL) x 100]*<br><br>*% by volume = 90 mL / 150 mL x 100*<br><br>***Answer** = 45 %* | solid remain on the bottom. We have a supersaturated solution.<br><br>If we heat the mixture to 50 °C, the remaining 9 g of glucose will dissolve. At the new temperature, the solubility limit in 100 mL of water is 244 g glucose. With only 100 g of glucose dissolved, the solution is now unsaturated.<br><br>If we cool the mixture back to 25 °C, 9 g of glucose should precipitate from the solution.<br><br>If glucose crystals do not form, the system has more dissolved glucose (100 g) than it can hold at 25 °C (91 g). We have a supersaturated solution.<br><br>**Activity 4.2: Identifying Types of Solution**<br><br>***A. Classify whether the the solution described is saturated, unsaturated, or supersaturated.***<br><br>*NOTE: Please refer to the given table below.* |



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**Activity 3.2**
**Practice Problem**

SOLVE THE FOLLOWING PROBLEMS:

1. Your mother prepared 25 grams of bleaching powder and 75 mL of water. She asked you to mix the 2 materials. What is the percent by mass of the solution you prepared?

***Answer:***
***% by mass***
$= \frac{mass\ of\ solute}{mass\ of\ solution} x\ 100$
$= \frac{25\ grams}{100\ grams} x\ 100$
***= 25% solution***

2. In your science class, your teacher demonstrates to the class how to prepare a solution containing 10 mL Hydrochloric acid and 100 mL water. What is the % by volume of the solution prepared by your teacher?

***Answer:***
***% by volume=***
$\frac{volume\ of\ solute}{volume\ of\ solution} x\ 100$
$= \frac{10.0\ mL}{110.0\ mL} x\ 100$
***= 9% solution***

| Temperature (°C) | Solubility of Sucrose (g/100 g $H_2O$) |
|---|---|
| 0 | 179 |
| 20 | 230.9 |
| 50 | 260.4 |
| 100 | 487 |

1. 50 grams of sugar in a pack were added to 100 mL of water at 20°C. All of the sugar dissolved, and none settled at the bottom.
***Unsaturated***

2. Additional 200 grams of sugar were added to the same mixture in number 1 with existing 50 grams sugar in the mixture and at 20°C, not all of the sugar crystals dissolved, and a few crystals of sugar settled at the bottom.
***Supersaturated***

3. When 300 grams of sugar was added to 100 mL of water at 20°C, some of the sugar crystals dissolved, and others settled at the bottom. To dissolve the sugar that does not dissolve, the temperature of the solution was increased to 100°C.
***Unsaturated***



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| After/Post-Lesson Proper | | | | |
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| *Making Generalizations and Abstractions* | The students will perform the 3-2-1 feedback, students will record three things they learned in the lesson, two facts, and one question they still have. Then, they will share their thoughts with a partner | Analyze each sentence and underline the word that best fits each statement.<br><br>1. When something (***melts*** or dissolves) only one substance is involved, and heat is needed for it to occur.<br><br>2. If a substance is (soluble, ***insoluble***) the solution may appear cloudy because of the undissolved particles.<br><br>3. (Solute, ***Solvent)*** affects solubility because it is present in a greater amount in solution. | 1. Differentiate percent by mass and percent by volume.<br><br>2. How is the understanding of the concentration of solutions beneficial to the following:<br>a. Medicine<br>b. Agriculture<br>c. Food<br>d. Energy<br>e. Health | Complete the statements below to express your understanding of the lesson.<br><br>1. When you go to the beach and dissolve salt in water, eventually, the water reaches a point where it cannot dissolve any more salt. This is a _____ (***saturated,*** unsaturated) salt solution<br><br>2. When you prepare iced tea and add sugar to it, you usually do not add as much sugar as the water can dissolve. Therefore, the sugar-water solution is _____ (saturated, ***unsaturated***) because more sugar could be dissolved if added.<br><br>3. Making rock candy involves creating a _____ (saturated, ***supersaturated***) solution of sugar and water. By heating the water and dissolving as much sugar as possible, then slowly cooling it down, more sugar is dissolved than would typically be |



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| | | | | possible at that temperature. |
| *Evaluating Learning* | The students will answer a short quiz.<br><br>Choose the best answer.<br><br>1. Which of the following substances is insoluble in water?<br>A. baking soda<br>***B. sand***<br>C. salt<br>D.sugar<br><br>2. Which of the following terms is used to describe a substance that dissolves easily in a solvent?<br>***A. soluble***<br>B. solute<br>C. solution<br>D. solvent<br><br>3. What is the term used to describe a substance that does not dissolve in a solvent?<br>A. soluble<br>***B. insoluble***<br>C. solute<br>D. solvent<br><br>4. Soluble and insoluble are for solid solutes and liquid solvents, while miscible and immiscible are for | 1. Samantha was experimenting in the laboratory. She observed that when she added sugar to water, it disappeared completely, and the resulting mixture looked homogeneous. What process did Samantha witness?<br>A. melting<br>***B. dissolving***<br>C. evaporation<br>D. condensation<br><br>2. During an experiment, Michael noticed that when he applied heat to an ice cube, it changed into liquid water. What is this process called?<br>A. sublimation<br>B. dissolving<br>***C. melting***<br>D. freezing<br><br>3. Lisa was trying to dissolve a certain powder in water, but it did not dissolve. What could be a likely explanation for this?<br>A. The water was too cold.<br>B. The powder was too colorful.<br>***C. The powder is insoluble in water.*** | **Choose the letter of the correct answer.**<br><br>1. Which of the following components affects the concentration of a solution?<br>A. amount of solute<br>B. amount of solvent<br>**C. amount of solute and solvent**<br>D. amount of time preparing the solution<br><br>2. What is the percent by mass of a solution made up of 50g sugar in 250g solution?<br>A. 17%<br>**B. 20%**<br>C. 0.2%<br>D. 0.17%<br><br>3. What is the percent by volume of mint syrup in a solution that contains 35mL mint syrup in 200mL of water?<br>***A. 14.89 % as % v/v is computed as 35 mL/235 mL x 100***<br>B. 17.5 % as % v/v is computed as 35 mL/200 mL x 100 | **Multiple Choice:**<br>**Choose the letter of the best answer.**<br><br>1. You are given a 40 mL solution in a beaker at 25°C. You added solute to the beaker and observed some particles did not dissolve. What solution is it?<br>A. saturated<br>B. unsaturated<br>C. concentrated<br>**D. supersaturated**<br><br>2. What would you do if you wanted to lessen the sweetness of a cup if hot milk was sweetened with sugar?<br>**A. Add water.**<br>B. Mix the milk solution well.<br>C. Add sugar.<br>D. Put it in the refrigerator for an hour.<br><br>3. How will you prepare an unsaturated solution of salt in water?<br>A. Freeze the mixture.<br>**B. Stir one teaspoon of salt crystals in 1 liter of water at room temperature.** |



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| | A. solid solute and solid solvent<br>***B. liquid solute and liquid solvent***<br>C. liquid solute and solid solvent<br>D. liquid solute and gas solvent<br><br>5. Which of the following substances is miscible in cooking oil?<br>A. vinegar<br>***B. kerosene***<br>C. water<br>D. alcohol | D. Lisa did not stir the mixture enough.<br><br>4. Jason was tasked with preparing a solution for an experiment. He had two substances, one solid, and one liquid. What factor should Jason consider to ensure they form a solution?<br>A. the color of the substances.<br>B. the temperature of the room.<br>***C. the nature of the solute and solvent.***<br>D. the size of the container.<br><br>5. Which of the following best highlights the importance of knowing the materials that dissolve?<br>A. It enhances our knowledge of historical events.<br>B. It improves our ability to predict weather.<br>***C. It allows for better control in chemical reactions.***<br>D. It enhances our body | C. 17.5 % as % v/v is computed as 35 mL/200 mL x 100<br>D. 35 % as % v/v is computed as 35 mL/100 mL x 100<br>E. 57.14 % as % v/v is computed as 200 mL/35 mL x 10<br><br>4. Which of the following statements differentiates between percent by mass and percent by volume?<br>***A. Percent by mass is the ratio of the mass of a solute to the total mass of the solution, while percent by volume is the ratio of the volume of the solute to the total volume of the solution.***<br>B. Percent by mass is the ratio of the volume of a solute to the total volume of the solution, while percent by volume is the ratio of the mass of the solute to the total mass of the solution.<br>C. Both percent by mass and percent by volume refer to the same | C. Add 1 cup of salt crystals to ½ cup water.<br>D. Add 3 teaspoons of salt to 3 teaspoons of water.<br><br>4. Angelica is working at a local candied fruit factory. She noticed that when sugar is added to the water in the candy-making process, there remain undissolved particles that settle at the bottom of the container. Which of the following will best solve the problem?<br>A. Stir the liquid vigorously.<br>B. Shake the mixing container very well.<br>C. Incorporate the sugar with other ingredients, add water then stir.<br>**D. Dissolve first the sugar in hot water before adding it to a large amount of water in the container.**<br><br>5. A saturated solution can hold 15 grams of solute per 100g of $H_2O$ at 100 °C. Suppose you stir 30g of the solute in 200g of water at 100 °C, what type of solution will you produce?<br>A. concentrated<br>B. supersaturated |



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| | | | concept and can be used interchangeably.<br>D. Percent by mass and percent by volume are only applicable to gaseous solutes and have no relevance in liquid or solid solutions.<br><br>5. Why is understanding percentage composition important in daily life?<br><br>A. It helps in mastering mathematical skills.<br>B. It contributes to the appreciation of art and culture.<br>**C. It is crucial for making informed decisions about nutrition and dietary choices.**<br>D. It is primarily relevant in advancing scientific research only. | **C. saturated**<br>D. unsaturated |
| *Additional Activities for Application or Remediation (if applicable)* | | | | |
| *Remarks* | | | | |
| *Reflection* | | | | |



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