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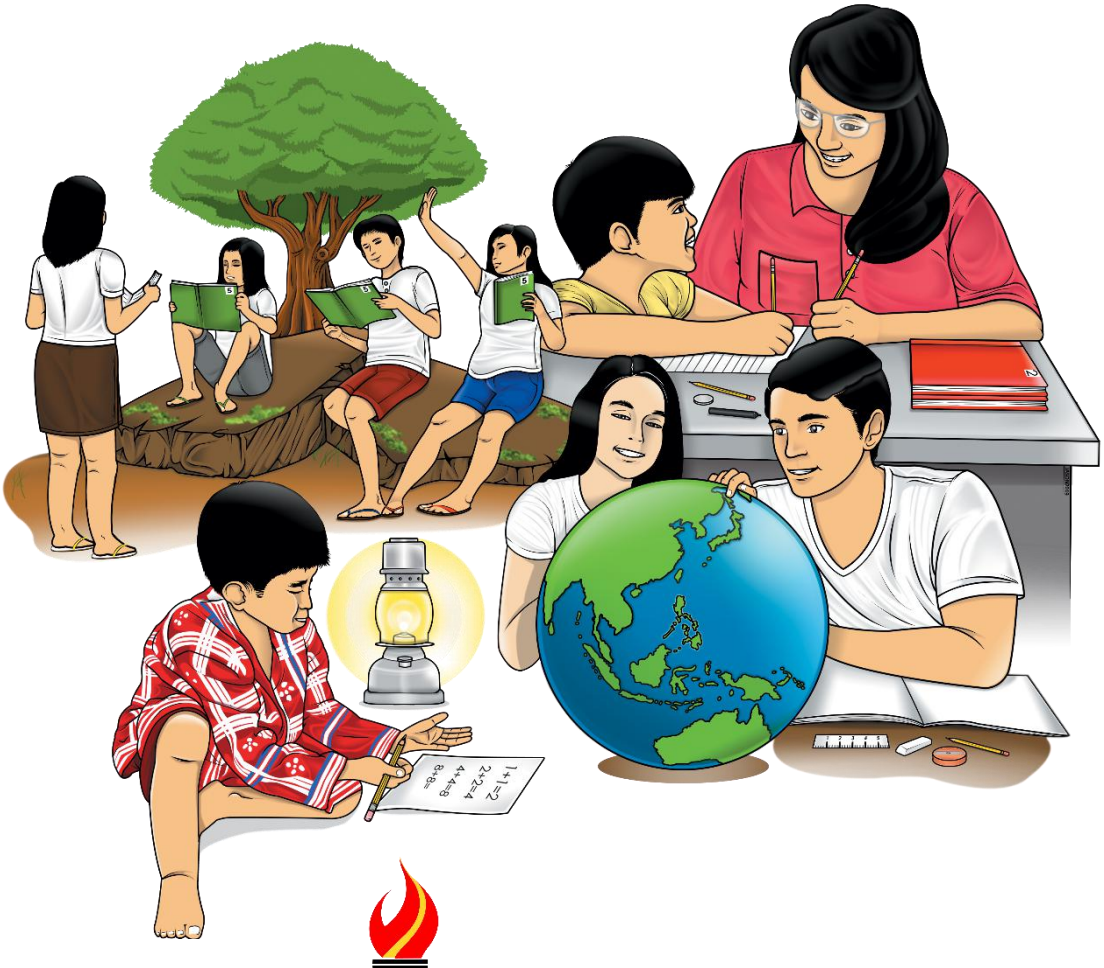
DepED
DEPARTMENT OF EDUCATION

Science

Quarter 1 – Module 1
Lesson 3: Factors Affecting Solubility



ALTERNATIVE DELIVERY MODE
ADM

What I Need to Know

This module was designed and written with you in mind. It is here to help you master the matter. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. But the order in which you read them can be changed to correspond with the textbook you are now using.

The module is about:

- Identifying factors affecting solubility

After going through this module, you are expected to be able to:

- Identify factors affecting solubility

What I Know

Directions: Read the following and write the letter of the correct answer. Do it in your journal or notebook.

1. Which of the following describes solubility?
   a. The ability of liquid to change color.
   b. The ability of something to dissolve in a liquid
   c. The time it takes for something to settle at the bottom of a liquid.
   d. The speed of pouring a liquid out of a container.

2. A greater amount of sugar will dissolve in warm water than in cold water. What factor affects the sugar's solubility?
   a. Temperature of solvent
   b. Amount of solute
   c. Nature of solute
   d. Manner of stirring

3. Which of the following does **not** affect the solubility of solid solutes?
   a. Volume of solvent
   b. Stirring
   c. Temperature
   d. Amount of solvent

4. A gram of salt can be dissolved in 100 ml of water. What factors affect the solubility?
   a. Amount of solute
   b. Amount of solvent
   c. Size of solute
   d. Manner of stirring
5. Choose the correct statement.
   a. A 100 ml water can dissolve a 1 tablespoon of sugar.

b. Any quantity of sugar can be dissolved in a given volume of water.

c. A given volume of solvent dissolves any quantity of solute.

d. None of these

Directions: Read the sentences carefully. Identify the factors that affect solubility for each sentence. Choose your answer inside the box. Do it in your journal or notebook.

A. TEMPERATURE	B.MANNER OF STIRRING
C.NATURE OF SOLUTE	D.AMOUNT OF SOLVENT
E.SIZE OF SOLUTE	

1. When the solution is heated, more solute will dissolve in the solvent.

2. Gasoline does not dissolve in water, does decreasing the solubility of gasoline.

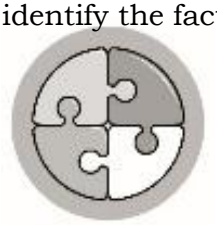
3. When 2 tablespoons of sugar are added to 200ml of water, more sugar particles are dissolved as compared when the same amount of sugar is dissolved in 50ml of water

4. Before using a suspension medicine, the label instructs you to shake it well before using it so as to dissolve the solute particles in the suspension.

5. More fine salts dissolve in water as compared to table salt mixed in water.

Lesson 3 Factors Affecting Solubility

After learning about the difference of solutes from solvents, we can now identify the factors affecting solubility.



What's In

Directions: Write √ whether the given solute is soluble and X if it is not soluble in the given solvent. Write your answer using your Science journal or notebook.

_____1. Salt and water
_____2. Nail polish and acetone
_____3. Paint and water
_____4. Pepper and soy sauce
_____5. Flour and oil

Using the illustrations, identify which of the following substances can be dissolved in water.

Nail polish

Paint

What's New

Directions: In the given situation, identify what factors affect the solubility of the following materials. Choose your answer inside the box and write your answer on your notebook.

Temperature	Nature of Solute	Manner of Stirring
Amount of solvent	Size of the Solute	

_____1. It tells about whether the solvent is in liquid, solid or in gas form.

_____2. It depends on how fast or slow mixture was stirred.

_____3. It tells whether the solute is soft or hard, powder or a whole piece.

_____4. It tells how hot or cold is the solvent mixed in a mixture.

_____5. It tells how much solvent is mixed in a mixture.

What is It

Solubility is the maximum amount of a solute substance that will dissolve in a given amount of solvent at a specific temperature. There are different factors that affect solubility:

- Nature of solute and solvent
- Temperature of solvent
- Manner of stirring
- Amount of solvent
- Size of the solute

The Effect of Nature of Solute and Solvent on Solubility:

Solubility of a solute in a solvent depends on the nature of both solute and solvent.

Example:

salt-(solute) dissolves in water-(solvent)

nail polish dissolves in acetone

We cannot dissolve nail polish in water but water can dissolve salt.

The Effect of Temperature of Solvent on Solubility

Temperature affects the solubility of a solution. Raising the temperature will increase the solubility of a solute in a solvent.

Example:

A hot water dissolves a medicine easily than cold water.

The Effect of Manner of Stirring on Solubility

Stirring affects how quickly a solute dissolves in a solvent. In the absence of stirring, the concentration of solute will be highest close to the pieces of solute, so more solute won't dissolve into the solution until it is stirred. The solute will dissolve faster by **diffusion**.

One important concept of solution is in defining how much solute is dissolved in a given amount of solvent. This called **concentration**. If the solution has small amount of solute it describes as a **Dilute** while **concentrated** describes solution that has a lot of solute in a given solvent. There is only a certain maximum amount of solute can be dissolved in a given solvent. This maximum amount is called the **solubility**.

What's More

Directions: Complete the following by choosing the correct word inside the parenthesis to complete the sentence. Write your answer using your Science journal or notebook.

1. Solubility is (increasing or decreasing) as temperature is rising.
2. Solubility is (increasing or decreasing) as temperature is decreasing.
3. Which substance is more soluble, sugar or flour? Why?

   _____

4. What will be the most effective means of increasing the dissolving rate of sugar in water?

   _____

5. Which solvent dissolves the sugar most quickly?
   - ☐ water
   - ☐ alcohol
   - ☐ mineral oil

Explain your answer.

_____

What I Have Learned

Directions: Write a short paragraph composes at least 10 sentences discussing factors affecting solubility. You may add illustrations to show how each factor affects the solubility. Do it in your Science journal.

_____

_____

What I Can Do

Directions: Read the questions carefully. Give the answer for the following. Do it in your Science journal or notebook.

1. What is the quickest way to dissolve milk in water? Can milk dissolve in all solvents? Explain your answer.

   _____

   _____

2. How are substances dissolved?

   _____

Assessment

Directions: Read the following and choose the letter of the correct answer. Do it in your Science journal.

1. To make a solution, you need a _____. This is the substance that gets dissolved.
   a. Solvent
   b. Solute
   c. Matter
   d. suspension

2. Which of the following describes solubility?
   a. The ability of liquid to change color.
   b. The ability of something to dissolve in a liquid
   c. The time it takes for something to settle at the bottom of a liquid.
   d. The speed of pouring a liquid out of a container.

3. A greater amount of sugar will dissolve in warm water than in cold water. What is the factor affecting the solubility?
    a. Temperature of solvent
    b. Amount of solute
    c. Nature of solute
    d. Manner of stirring

4. Which of the following does not affect the solubility of solid solutes?
    a. Volume of solvent
    b. Temperature
    c. Stirring
    d. Amount of mixture

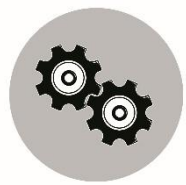
5. Solubility is _____ as temperature is increases .
    a. Increasing
    b. Decreasing
    c. Neutral
    d. None of these

6. _____ is one of the factors affect solubility and it depends on how fast or slow mixture is stirred.
    a. Manner of stirring
    b. Temperature
    c. Nature of solute
    d. Volume of solvent

7. It tells about whether the solvent is in liquid, solid or in gas form.
    a. Manner of stirring
    b. Temperature
    c. Nature of solute
    d. Nature of solvent

8. It tells whether the solute is soft or hard, powder or a whole piece.
    a. Manner of stirring
    b. Temperature
    c. Nature of solute
    d. Nature of solvent

9. It tells how hot or cold are the solvents mixed in a mixture.
    a. Manner of stirring
    b. Temperature
    c. Nature of solute
    d. Nature of solvent
10. What is known as the universal solvent?
    a. water
    b. acetone
    c. vinegar
    d. soy sauce



Additional Activities

Directions: Choose what solute can be dissolved in the given solvents. To complete the statements below for number 1-5, choose your answer inside the box. For numbers 6-10, fill in the blanks to complete each statement. Do it in your Science journal or notebook.

Solvents	**Solute**
1. cold water 2. alcohol 3. hot water 4. vinegar 5. acetone	

sugar
powdered juice
nail polish
salt
ink

6. Acetone can dissolve _____ but not the _____.
7. Hot water can easily dissolve _____ and _____.
8. Chocolate drink can easily be dissolved in _____ water than in _____water.
9. A pinch of salt can be easily dissolved in _____ than in oil.
10. Stirring _____ makes the powdered juice dissolve easily in cold water.

Answer Key

What I Know	What's In	What's New
1. b 2. a 3. d 4. b 5. a 6. Temperature 7. Nature of solute 8. Amount of solvent 9. Manner of Stirring 10. Size of solute	1. √ 2. √ 3. X 4. √ 5. X B.1. Sugar 2. Salt	1.Nature of Solvent 2. Manner of Stirring 3. Nature of Solute 4. Temperature 5. Amount of Solvent
What's More	**What I can do**	**Assessment**
1. Increasing 2. Decreasing 3. Sugar 4. Use hot water 5. water	1.The quickest way to dissolve milk in water is when it is heated it ,the higher the temperature of the solvent the more solute will be dissolved. 2.Substance dissolves when the solute breaks up from a larger particles into much smaller particles by a solvent.	1. a 2. b 3. a 4. d 5. a 6. a 7. d 8. c 9. b 10. a