



Science and Health

FACTORS THAT AFFECT HOW A SOLUTE DISSOLVES IN A SOLVENT









A DepEd-BEAM Distance Learning Program supported by the Australian Agency for International Development



Stirring is one factor that affects how a solute dissolves in a solvent. In this module you will learn more factors that will make the solute in each mixture dissolve faster.



Perform an activity to test the effect of stirring, temperature and the size of particles in dissolving solute.



A. Identify the condition that will make the solute in each mixture dissolve faster. Write <u>stirring</u>, <u>crushing</u>, or <u>using</u> <u>heat energy</u> in your notebook.

_____1. maggi cubes and water

- _____2. powdered milk and water
- 3. salt and water
- _____4. instant coffee and water
- _____5. sugar and pure buko juice



- Stirring or shaking causes the particles to move faster resulting to greater contact or even collision of the particles of solute and solvent. When this happens, the solute dissolves faster.
- Crushing, cutting or grinding reduces the solute into smaller pieces which results to a decrease in its surface area. When the surface area is small it is easier for the solute to make contact with the solvent thus dissolution is faster.
- An increase in temperature (heat energy) will result to faster movement of the particles. When this happens, possibility of contact between the solute and solvent increases thus results to faster dissolution of the solute in a given solvent.

Substances have different reactions when mixed in water. Some substances like sugar, coffee, milk and salt spread evenly when mixed with water.

These are factors that affect how a solute dissolves in a solvent. These are stirring, crushing and using heat energy.

<u>Stirring or shaking the substance</u> with solutes make the solid particles dissolve faster. This happens because stirring caused the surface of each tiny particle of substances like sugar, coffee and other to be pulled away by the water. The substances will dissolve faster if the surface of all the tiny particles are in contact with the water.

<u>Crushing</u> the solid makes it dissolves faster. There are materials in powder form like the powdered soap, rocky salt that dissolve faster than the same materials which are in solid or compact form.

<u>Heat energy</u> is another factor that affects how a solute dissolves in a solvent. The heat increases the temperature of solvent and solute (e.g. hot water) which caused the particles of substances (e.g. sugar) to move faster. As motion of solute and solvent increases, there is also a greater chance for the solvent and solute to make a contact with each other.



Activity 1

Do the following:

- 1. Prepare two glasses. Half-fill each glass with water.
- 2. Put one teaspoon of salt into each glass.
- 3. Stir the water in one glass. Do not stir the water in the other glass.
- 4. Observe the two glasses.

Answer the following questions in your notebook.

- 1. In which glass of water did the salt dissolve faster?
- 2. What do you think will happen if you did not stir the water in the other glass?
- 3. What made the salt particles dissolve faster? Why do you think this happen?

Activity 2

Do the following:

- a. Prepare two empty glasses.
- b. Half-fill the first glass with cold water. With the help of an adult, half-fill the second glass with hot water.
- c. Place one teaspoon of sugar in each glass.
- d. Observe in which glass does the sugar dissolve faster.

Answer the following questions in your notebook.

- 1. In which glass did the sugar dissolve faster?
- 2. What made the sugar in one glass dissolve faster than in the other glass?
- 3. What factor affects the sugar to dissolve faster in one glass?

Activity 3

Do the following:

- 1. Prepare two glasses, a teaspoon of powdered soap and a small piece of detergent bar.
- 2. Place equal amounts of water in two glasses.
- 3. Add a teaspoon of powdered soap in one glass and a small piece of detergent bar in the other glass.
- 4. Observe which solid dissolves faster.

Answer the following questions in your notebook.

- 1. What solid materials did you add in the two glasses with water?
- 2. What is the difference between a powdered soap and a detergent bar?
- 3. Which solid material dissolves faster?
- 4. What made the powdered soap dissolved faster?
- 5. If you will crush or break the piece of detergent bar into small pieces and place it in water, will it dissolve faster? Why or why not?



- A. Identify which of the following mixtures need stirring, crushing and heat energy to dissolve solutes faster. Write your answer in your notebook.
 - _____1. solid sugar and water
 - _____ 2. rock salt and water
 - ______ 3. sugar and calamansi juice
 - ______4. powdered milk and water
 - ______5. maggi cubes and water
 - _____6. flour and water
 - _____7. salt and water
 - ______8. instant coffee and sugar
 - ______9. powdered soap and water
 - _____10. solid chalk and water
 - _____ 11. solid alum or "tawas" and water
- B. Read the situations below. Answer the given questions in your notebook.
 - 1. Mother told you to prepare a glass of milk for your small brother. After putting amounts of sugar into the glass, you noticed that the sugar particles are still there. What should you do to make the sugar dissolve faster?
 - 2. In your EPP subject, your group was assigned to cook fish "sinigang". Your classmate bought rock salt instead of fine salt. What should you do to the rock salt so that it will dissolve faster in your sinigang?





Encircle the letter of the correct answer.

- 1. Which of the following materials does not dissolve in water? a. salt b. soap c. sugar d. plastic
- 2. Which liquid can dissolve most materials? a. alcohol b. gasoline c. water d. acetone
- 3. What do you call the substance that easily dissolves in a solvent?a. insoluble b. semi-soluble c. soluble d. solubility
- 4. The liquid that is used to dissolve another substance is called _.

a. solute b. solvent c. solution d. solubility

- 5. Which is the most soluble in water?
 - a. small piece of paper c. powdered detergent
 - b. small chuck of soap d. iodized salt





The Brownian motion is a phenomenon of the movements of molecules in a suspension:

The molecules of a liquid or gas substance in a suspension move very rapidly. They collide with other particles suspended in the mixture. These collisions enable the particles to resist their natural tendency to settle because of gravity. The rapid motion of the suspended particles that results from the collisions is called Brownian motion.

This phenomenon was discovered in 1827 by the British botanist named Robert Brown. He found out that the molecules of the liquid inside a cell strike the suspended particles at random making them move.

Based on the principle of the Brownian motion, two other famous scientists made other discoveries. They are Albert Einstein and Amadeo Avogadro.

Source: Science Spectrum 4



Let's Try This

- 1. using heat energy
- 2. stirring
- 3. stirring
- 4. stirring
- 5. stirring

Let's Do This

Activity 1

- 1. The glass that I stirred.
- 2. Salt will not dissolve fast.
- 3. Stirring caused the particles to move faster resulting to greater contact of solute and student.

Activity 2

- 1. In a glass with hot water.
- 2. The hot temperature of the water made the sugar dissolve faster.
- 3. Temperature

Activity 3

- 1. I added powdered soap and detergent bar in the two glasses of water.
- 2. Powdered soap has fine particles while the detergent bar has hard texture.
- 3. Powdered soap dissolves faster.
- 4. It's tiny particles.
- 5. Yes, because the substances will dissolve faster if the surface of all the small pieces are in contact with the water.

Let's Do More

- A. 1. stirring
 - 2. crushing
 - 3. stirring
 - 4. stirring
 - 5. heat energy
 - 6. stirring
 - 7. stirring
 - 8. heat energy
 - 9. stirring
 - 10. crushing
 - 11. crushing
- B. 1. stir it
 - 2. using heat energy

Let's Test Ourselves

- 1. d
- 2. c
- 3. c
- 4. b
- 5. d