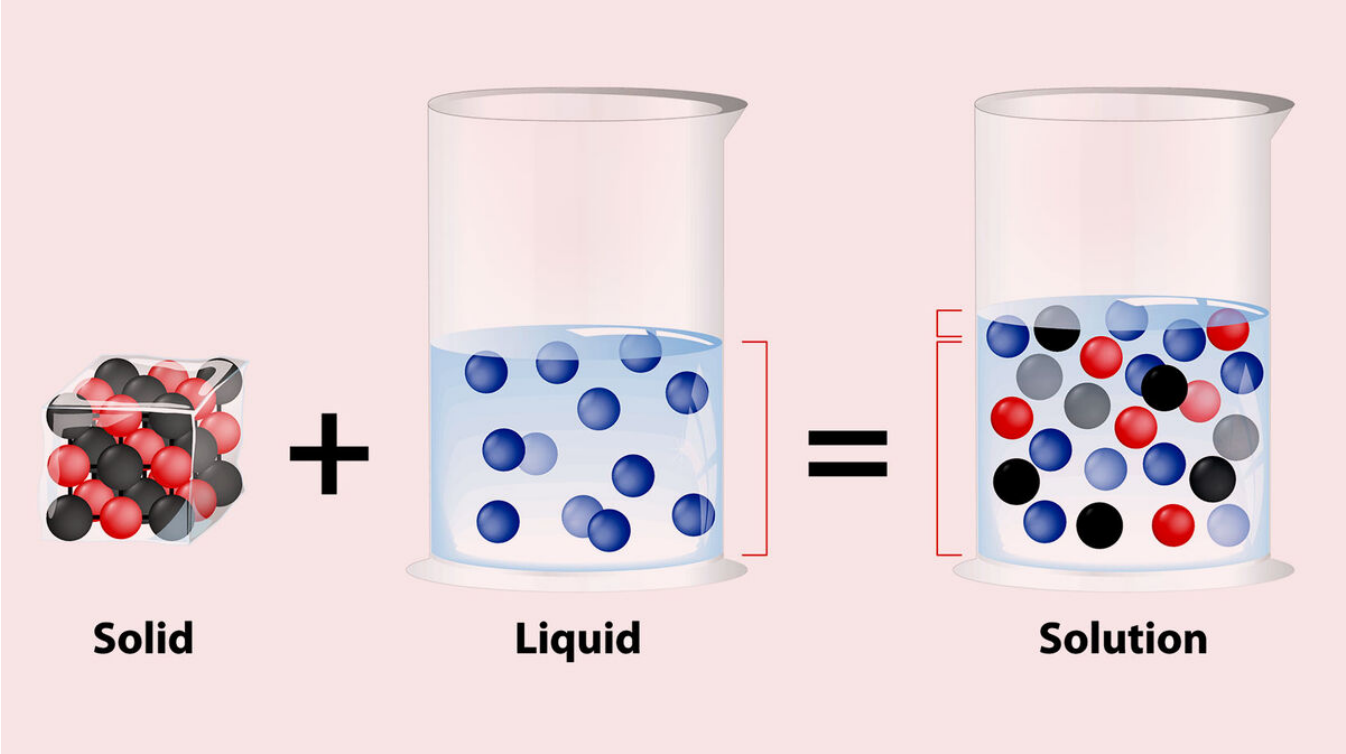
F. Solutions

Solutions

In science, a solution is a special type of mixture where one substance is completely dissolved in another substance. When you mix sugar in water until it disappears, you have made a solution!



What Is a Solution?
A solution is made up of two main parts: the solute and the solvent. The solute is the substance that gets dissolved, and the solvent is the substance that does the dissolving. For example, in sugar water, the sugar is the solute, and the water is the solvent.

Solubility
Not all substances can dissolve in water or other solvents. Some substances, like sugar and salt, dissolve easily, while others, like sand or oil, do not dissolve at all. The ability of a substance to dissolve in a solvent is called its solubility.

Factors Affecting Solubility
Several factors can affect the solubility of a substance. One important factor is temperature. In general, solids dissolve better in hot liquids than in cold liquids. For example, if you try to dissolve sugar in cold water, it may take longer than if you use hot water.

Concentration
The concentration of a solution refers to how much solute is dissolved in a given amount of solvent. It is usually measured in grams of solute per milliliter of solvent (g/mL) or

grams of solute per liter of solution (g/L). A solution with a high concentration has a lot of solute, while a solution with a low concentration has less solute.

Dilution
Dilution is the process of making a solution less concentrated by adding more solvent. For example, if you have a strong solution of juice and you add more water to it, you are diluting the juice.

Saturation
A solution is considered saturated when it contains the maximum amount of solute that can dissolve in a given amount of solvent at a particular temperature. If you try to add more solute to a saturated solution, it will not dissolve and will settle at the bottom.

Homogeneous Mixture
Solutions are considered homogeneous mixtures because they have the same composition throughout. This means that every part of the solution looks the same and has the same properties.

Examples of Solutions
Solutions are all around us! Here are some common examples of solutions:

1. **Saltwater**
   A solution of salt (solute) in water (solvent).

2. **Lemonade**
   A solution of sugar (solute) in water (solvent) with lemon juice.

3. **Vinegar**
   A solution of acetic acid (solute) in water (solvent).

4. **Air**
   A solution of various gases like oxygen, nitrogen, and carbon dioxide in the atmosphere.

1. What is a solution in science?
   A) A mixture of two substances that do not dissolve.
   B) A mixture of two substances where one completely dissolves in the other.
   C) A mixture of two substances that form layers.
   D) A mixture of two substances with a strong odor.

2. What is the solute in sugar water?
   A) Sugar
   B) Water
   C) Salt
   D) Lemon juice

3. What do we call the substance that does the dissolving in a solution?

A) Solute
B) Solvent
C) Concentration
D) Dilution

4. What is solubility?
   A) The ability of a substance to dissolve in a solvent.
   B) The concentration of a solution.
   C) The process of making a solution less concentrated.
   D) The process of making a solution more concentrated.

5. How does temperature affect the solubility of solids in liquids?
   A) Solids dissolve better in cold liquids.
   B) Solids dissolve better in hot liquids.
   C) Temperature does not affect solubility.
   D) Solids do not dissolve in liquids.

6. What does concentration of a solution measure?
   A) The amount of solute in the solvent.
   B) The amount of solvent in the solute.
   C) The amount of solution in the solute.
   D) The amount of solute in the solution.

7. What is dilution?
   A) The process of making a solution more concentrated.
   B) The process of making a solution less concentrated.
   C) The process of separating a solution into its components.
   D) The process of freezing a solution.

8. When is a solution considered saturated?
   A) When it contains the maximum amount of solute that can dissolve in a solvent.
   B) When it contains a small amount of solute.
   C) When it contains no solute at all.
   D) When it contains more solvent than solute.

9. Why are solutions considered homogeneous mixtures?
   A) Because they have different compositions throughout.
   B) Because they have the same composition throughout.
   C) Because they have layers of different substances.
   D) Because they have a strong odor.

10. Which of the following is an example of a solution?
    A) Oil and water
    B) Sugar and sand
    C) Lemonade
    D) Iron and aluminum

ANSWERS & EXPLANATIONS

1. B - A mixture of two substances where one completely dissolves in the other.
    - A solution is a special type of mixture where one substance is completely dissolved in another substance.

2. A - Sugar.
    - In sugar water, the sugar is the solute that gets dissolved in water, which is the solvent.

3. B - Solvent.
    - The solvent is the substance that does the dissolving in a solution.

4. A - The ability of a substance to dissolve in a solvent.
    - Solubility is the ability of a substance to dissolve in a solvent.

5. B - Solids dissolve better in hot liquids.
    - In general, solids dissolve better in hot liquids than in cold liquids.

6. A - The amount of solute in the solvent.
    - Concentration measures how much solute is dissolved in a given amount of solvent.

7. B - The process of making a solution less concentrated.
    - Dilution is the process of adding more solvent to make a solution less concentrated.

8. A - When it contains the maximum amount of solute that can dissolve in a solvent.
    - A saturated solution has the maximum amount of solute that can dissolve at a particular temperature.

9. B - Because they have the same composition throughout.
    - Homogeneous mixtures, like solutions, have the same composition throughout.

10. C - Lemonade.
    - Lemonade is a solution made of sugar (solute) dissolved in water (solvent) with lemon juice.