

What Are Solutions and Solubility?

Worksheet

A solution is a uniform mixture of solute and solvent. Solubility is the limit of dissolving - measured in g per 100 mL of solvent; once reached, excess solute falls out (precipitate).

Questions

1. What is a solvent?

- A) The dissolved substance
- B) The dissolving medium
- C) The mixture
- D) The precipitate

2. A saturated solution contains

- A) No dissolved solute
- B) Less solute than possible
- C) Maximum solute possible
- D) Only solvent

3. If solubility is 40 g/100 mL and 30 g dissolves, the solution is

- A) Saturated
- B) Supersaturated
- C) Unsaturated
- D) No solution

4. Cooling a saturated solution typically causes

- A) No change
- B) Precipitation
- C) More dissolving
- D) Crystallization

5. 25 g of NaCl dissolves in 100 mL of water at 20°C. The solubility of NaCl at 20°C is 36 g per 100 mL. Is the solution saturated?

6. A solution contains 40 g of sugar in 200 mL of water. The solubility of sugar is 200 g per 100 mL. What percent is dissolved?

7. At 100°C, 39 g of KNO₃ per 100 mL water. At 20°C, only 13 g per 100 mL. A saturated solution at 100°C is cooled to 20°C. What happens?

8. Define: What is a solution?

9. Define: Define solubility.

10. Define: What is saturation?

Answer Key

1. B) The dissolving medium - A solvent is the medium (usually water) in which a solute dissolves.
2. C) Maximum solute possible - A saturated solution has dissolved the maximum solute at that temperature.
3. C) Unsaturated - $30\text{ g} < 40\text{ g}$ limit = unsaturated; more can dissolve.
4. D) Crystallization - Lower temperature decreases solubility for most solids excess precipitates.
5. Solubility limit: 36 g per 100 mL. Actual solute: $25\text{ g} < 36\text{ g}$. The solution is UNSATURATED.
6. Mass percent = $(40 / (40 + 200)) 100 = (40/240) 100 = 16.7\%$. About 16.7% sugar by mass.
7. At 100C: 39 g dissolved = saturated. At 20C: solubility drops to 13 g. The extra 26 g precipitates out.
8. A homogeneous mixture of a solute (dissolved) and solvent.
9. The maximum amount of solute that dissolves in a solvent at a given temperature.
10. The state when solute concentration equals solubility; no more dissolves.

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