What is Solution Concentration?

Worksheet

Solution concentration is the amount of solute per unit volume (molarity: mol/L) or mass (molality: mol/kg, percent: g solute per 100 g solution). Choice of unit depends on the application.

Questions

1. What is molarity?

A) moles per kg solvent
B) moles per L solution
C) grams per L
D) percent by mass

2. If you dilute 1 L of 1 M HCl to 2 L, the new molarity is

A) 0.5 M
B) 1 M
C) 2 M
D) Cannot determine

3. Why use molality for colligative properties instead of molarity?

A) It's easier
B) It depends on temperature (mass doesn't change with T)
C) It's more accurate
D) There's no reason

4. Percent by mass formula?

A) (mass solute / mass solvent) 100%
B) (mass solute / mass solution) 100%
C) (volume solute / volume solution) 100%
D) (moles / volume) 100%

5. What is the molarity of 2 mol of NaCl dissolved in 500 mL of solution?

6. A 0.2 M HCl solution contains how many grams of HCl per liter? (M = 36.5 g/mol)

7. Calculate molality: 50 g glucose (M = 180 g/mol) in 500 g water.

8. Define: Define molarity.

9. Define: Define molality.

10. Define: Percent by mass (w/w)?

Answer Key

1. B) moles per L solution - Molarity (M) = mol solute / L solution.

2. A) 0.5 M - MV = MV 1 1 = M 2 M = 0.5 M.

3. B) It depends on temperature (mass doesn't change with T) - Molality uses mass, which is temperature-independent. Molarity changes with temperature due to solution expansion.

4. B) (mass solute / mass solution) 100% - W/w% = (solute mass / total solution mass) 100%.

5. M = n/V = 2 mol / 0.5 L = 4 M

6. n = M V = 0.2 1 L = 0.2 mol mass = 0.2 mol 36.5 g/mol = 7.3 g

7. n = 50 g / 180 g/mol = 0.278 mol m = n / mass(solvent in kg) = 0.278 / 0.5 = 0.556 m

8. Moles of solute per liter of solution. M = n/V.

9. Moles of solute per kilogram of solvent. m = n/mass(kg).

10. (mass of solute / mass of solution) 100%.