

Name: _____

Solutions Unit Part 1 Review - Practice Test

Part A: Multiple Choice [5]

1. What will the effect of **decreasing** the temperature have on the solubility of a **gas**?
 - a) Solubility will increase
 - b) Solubility will decrease
 - c) Gas will precipitate
 - d) Solubility will not be affected

2. Which of the following is correct?
 - a) ionic and polar solute dissolve in polar solvents
 - b) non polar solutes dissolve in polar solvents
 - c) ionic and non polar solutes dissolve in non polar solvents
 - d) non polar and polar solutes dissolve in highly polar solvents

3. Gasoline and water do not mix well. How would you describe this mixture?
 - a) homogeneous
 - b) insoluble
 - c) miscible
 - d) immiscible
 - e) inaqueous

4. What is a solution of two or more metals called?
 - a) metalloid
 - b) miscible
 - c) alloy
 - d) isotope

5. A solution that has a large quantity of solute dissolved in the solvent is
 - a) homogeneous
 - b) strong
 - c) dilute
 - d) concentrated

Part B: Short Answer Communication [14]

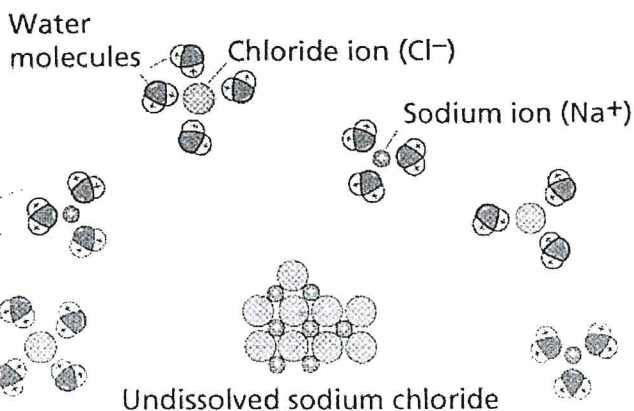
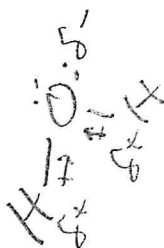
1. Match up. Write the correct letter on the line. [5 marks]

- L A solution that has not reached its maximum holding capacity at a given temperature.
- M Another word for concentration
- H When the solvent is water.
- A Reducing the concentration by adding water
- D Part of solution that gets dissolved.

- A. Dilution
 B. pH
 C. Miscible
 D. solute
 E. solvent
 F. Strong
 G. Dehydrated
 H. Aqueous
 I. Alloy
 J. supersaturated
 K. saturated
 L. unsaturated
 M. Molarity

2. Using the diagram as a guide to help you fill in the blanks to explain how salt dissolves in water. Use the words below to assist you. [5 marks]

The ions in the salt are held together by an electrostatic attraction. This creates an ionic bond. The bonds between atoms within a molecule are called intramolecular bonds. When crystals of salt are dropped into water they dissolve. A water molecule is held together by polar covalent bonds. This is because the partially negative oxygen atoms in the water are attracted to the positively charged sodium in the salt. These positive ions are also called cations. The partially positive charged hydrogen atoms in the water are attracted to the negative chlorine ion in the salt. This intermolecular attraction between the water and salt molecule is greater than the attraction within the salt. Therefore the crystal lattice gets pulled apart and the mobile ions are in solution. The salt is 'dissolved'.



| | | |
|----------|----------------|-----------|
| Chlorine | Intermolecular | Anion |
| Hydrogen | Intramolecular | Cation |
| Sodium | Aqueous | Ionic |
| Chlorine | Lattice | Soluble |
| Covalent | Oxygen | Non-polar |
| | | Polar |

3. List 2 factors that **increase**/speed up the 'rate' of solubility for a **solid solute**. Explain how each increases the rate. [4 marks]

| Factor | Explanation – how and why it affects the rate? |
|--------------------------|--|
| ↑ S.A. or ↑ Agitation | See notes for explanation. |
| or ↑ temp | |

Part C: Calculations and Equations /A Full solutions must be show for mark [8 marks]

1. A saturated solution of sodium acetate, NaCH_3COO , can be prepared by dissolving 4.65 g in 10 mL of water at 20 °C. What is the molar concentration? [2 marks]

$$m = 4.65 \text{ g}$$

$$V = 10 \text{ mL} = 0.01 \text{ L}$$

$$C = \frac{n}{V(\text{L})}$$

$$C = \left(\frac{m}{MM} \right) \left(\frac{4.65 \text{ g}}{82.034 \text{ g/mol}} \right) = \boxed{5.7 \frac{\text{mol}}{\text{L}}}$$

2. Dilution of aqueous solutions is an essential laboratory skill. What volume of a 16.0 mol/L nitric acid must be diluted to prepare 300 mL of a 0.66 mol/L nitric acid solution? [2 marks]

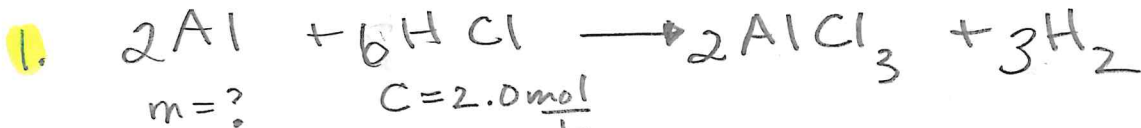
$$C_1 V_1 = C_2 V_2$$

$$M_1 V_1 = M_2 V_2$$

$$\left(16 \frac{\text{mol}}{\text{L}} \right) V_1 = (0.66)(300 \text{ mL})$$

$$\boxed{V_1 = 12.375 \text{ mL}}$$

3. How many grams of aluminum are required to react with 35 mL of 2.0 M of hydrochloric acid. Start with a balanced equation (stoichiometry). [4 marks]



$m = ?$

$C = 2.0 \frac{\text{mol}}{\text{L}}$

$V = 35 \text{ mL}$

2.

$$n = C \times V$$

$$= 2.0 \times 0.035 \text{ L}$$

$$= 0.07 \text{ mol}$$

4. $m_{\text{Al}} = n_{\text{Al}} \times MM_{\text{Al}}$

$$= 0.0233 \text{ mol} \times 26.98 \frac{\text{g}}{\text{mol}}$$

$\boxed{0.63 \text{ g}}$

3. Ratio $\frac{\text{Al}}{\text{HCl}} = \frac{2}{6} = \frac{x}{0.07}$ $x = 0.0233 \text{ mol Al}$

4. Use the Solubility curves below to answer the questions below. [5 marks]

a) What is the solubility of potassium chloride at 40°C?

$\approx 39 \text{ g} / 100 \text{ g H}_2\text{O}$

b) What mass of sodium chloride will dissolve in 100 grams of water at 0°C?

$\approx 28 \text{ g} / 100 \text{ g H}_2\text{O}$

c) At what temperature do sodium nitrate and potassium nitrate have the same solubility?

70°C

d) If 120 g of sodium nitrate is added to 100g of water at 50°C, how much will remain un-dissolved?

$120 - 115 = 5 \text{ g}$

e) A point below the curve is what type of solution?

Unsaturated.

