

Chapter 13.2-4 & 15 Review Sheet: Solids, Liquids & Solutions

Chapter 13.2 – 13.4

1. Three intermolecular forces: Hydrogen bonding (strongest), dipole-dipole & dispersion forces.
 2. Strength of IMF depends on polarity of the material.
 3. Hydrogen bonding present when H bonded to N, O or F
 4. Viscosity and surface tension depend on IMF. Viscosity decreases with temperature.
 5. For most materials, solids are denser than liquids.
 - a. Solid water (ice) less dense than liquid water due to H-bonding
 6. Crystalline solids have long-range structure; amorphous solids lack long-range order.
 7. Melting, boiling & sublimation absorb energy. Freezing, condensation & deposition release energy.
 8. Phase changes occur at constant T (KE constant, Potential Energy changing)
 - a. Potential energy changes due to changes in intermolecular distances
 9. Vapor pressure decreases and boiling point increases as IMF increases.
 10. Boiling point is T at which vapor pressure equals atmospheric pressure.
 - a. BP decreases as pressure decreases (higher elevation), increases as IMF increases
 11. Phase Diagrams, including phase changes, triple & critical points
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Chapter 15

1. Water dissolves ionic and polar covalent solutes due to dipole-dipole and ion-dipole forces
 2. Solvation rate is affected by temperature, agitation, and particle size.
 3. Use the solubility curves to determine solubility or temperature
 4. The solubility of *most* solids increases with temperature; gases decrease.
 5. Henry's Law: Solubility of gases is directly proportional to their pressure: $\frac{S_1}{P_1} = \frac{S_2}{P_2}$
 6. Saturated solutions contain maximum amount of solute; unsaturated solutions contain less solute than possible; supersaturated solutions contain more (must heat and slowly cool).
 7. Perform solution concentration problems using the Molarity & dilution equations (on reference sheet)
 8. Describe the process of preparing a Molar solution from the solid solute, including what kind of glassware you would use (remember the lab).
 9. Describe the process of preparing a Molar solution from a concentrated stock solution, including what kinds of glassware you would use (remember the lab).
 10. Use the stoichiometry flowchart on Chart G to solve problems involving volumes and concentrations.
 11. Describe colligative properties: vapor pressure lowering, boiling point elevation, freezing point depression.
 12. Solutions experience freezing point depression and boiling point elevation because solute blocks solvent.
 13. The particles in a colloid remain suspended due to electrostatic attraction to dispersing medium.
 - a. Can be separated using centrifuge.
 14. Colloids and suspensions scatter light (the Tyndall effect) because particle size is large.
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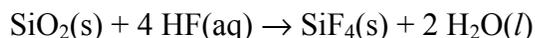
- Chapter 13 Chapter Assessment pp. 414-415 #37, 38, 39, 41, 44, 49, 51, 52, 53, 58, 60
- Chapter 15 Chapter Assessment pp. 484-485 #48, 49, 50, 57, 58, 60, 61, 62, 63, 64, 67, 68, 76(a,c), 77(a,c), 78(a,c), 79(a,c), 80, 81
- Ch. Extra Review Problems:

1. What is the solubility of SO₂ at 15.8 atm if the solubility of SO₂ is 0.25 g/L at 1.50 atm?

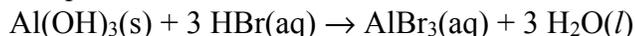
2. At what pressure will the solubility of a gas be 0.98 g/L if the solubility at 0.85 atm is 0.14 g/L?

3. What is the molarity of a solution containing 73.8 g SrBr₂ in a volume of 250 mL?
4. How many grams of NaF are in 300. mL of a 0.350 M solution?
5. How many L of a 2.53 M solution of RbCl contains 8.29 g of RbCl?
6. What is the final concentration of a solution when 75.0 mL of 8.50 M HCl is diluted to 500.0 mL?
7. How many mL of 16.0 M H₂SO₄ stock solution must be used to make 250 mL of 0.600 M solution?
8. How many mL of 0.58 M BaCl₂ are needed to completely react with 10.0 mL of 0.58 M Al₂(SO₄)₃? The balanced reaction is:
- $$3 \text{BaCl}_2(\text{aq}) + \text{Al}_2(\text{SO}_4)_3(\text{aq}) \rightarrow 3 \text{BaSO}_4(\text{s}) + 2 \text{AlCl}_3(\text{aq})$$
9. How many mL of 1.08 M Fe₂(SO₄)₃ are needed to fully react with 50.0 mL of 0.298 M KOH according to the following balanced reaction?
- $$\text{Fe}_2(\text{SO}_4)_3(\text{aq}) + 6 \text{KOH}(\text{aq}) \rightarrow 3 \text{K}_2\text{SO}_4(\text{aq}) + 2 \text{Fe}(\text{OH})_3(\text{s})$$

10. How many mL of 0.682 M HF would be needed to form 29.8 g SiF₄ with excess SiO₂ by the following balanced reaction?



11. How many grams of Al(OH)₃ are required for complete reaction with the HBr in 615 mL of a 0.375 M HBr solution? The balanced equation for the reaction is:



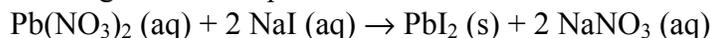
12. What is the concentration of FeCl₂ in 15.00 mL of a solution that reacts with 12.83 mL of 0.105 M KMnO₄ according to the following balanced equation?



- a. How many *moles* of FeCl₂ reacted?

- b. What is the concentration of the FeCl₂ solution, in M?

13. What is the concentration of NaI solution if 25.00 mL reacts with excess Pb(NO₃)₂ to produce 2.78 g PbI₂ according to the following balanced equation?



- a. How many *moles* of NaI reacted?

- b. What is the concentration of the NaI solution, in M?

Answers: 76a) 2.5 M; c) 5.64 M; 77a) 0.0202 M; c) 0.0847 M; 78a) 0.0320 mol; c) 0.648 mol; 79a) 0.0589 g KOH; c) 5.92 g NH₄OH; 80) 36.8 mL; 81) 1.00 × 10³ mL; Extra Problems: 1) 2.63 g/L; 2) 5.95 atm; 3) 1.19 M; 4) 4.41 g; 5) 0.0271 L [27.1 mL]; 6) 1.28 M; 7) 9.38 mL; 8) 30.0 mL BaCl₂; 9) 2.30 mL Fe₂(SO₄)₃; 10) 1.680 mL HF; 11) 6.00 g Al(OH)₃; 12a) 0.00674 mol FeCl₂; 12b) 0.449 M; 13a) 0.0121 mol NaI; 13b) 0.484 M.