

Honors Chemistry – Unit 7 Review

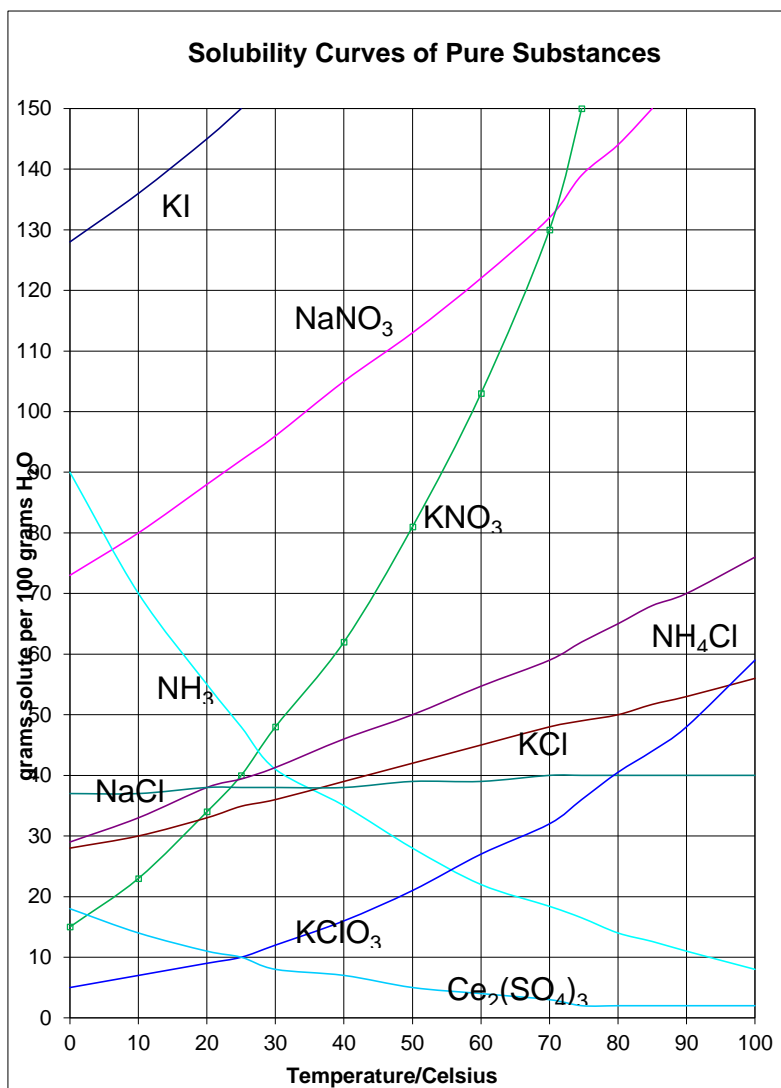
Chapter 16 – Solutions

SOLUTIONS & SOLUBILITY VOCABULARY & CONCEPTS

- _____ is the substance that is dissolved.
- _____ is the substance that does the dissolving.
- _____ is a homogeneous solution.
- A _____ solution has the maximum amount of solute dissolved in a given amount of solvent.
- An _____ solution can dissolve more solute.
- Opposite of soluble is _____.
- _____ is how many grams of solute dissolves in 100 mL of water.
- For most solid solutes, as temperature goes up, solubility goes _____.
- For most gas solutes, as temperature goes up solubility goes _____.
- What are the three factors that an increase the rate of dissolving of a solute? Explain how they aid a substance in dissolving on a molecular level.
- Why must you keep a carbonated beverage cool to prevent it from going “flat”?
- Explain the difference among saturated, unsaturated, and supersaturated solutions.

SOLUBILITY CHARTS – use the graph to the right

- What is the solubility of NaCl at 25°C?
- What is the solubility of KNO₃ at 70°C?
- At what temperature is the solubility of NaNO₃ 90g/100mL H₂O? Remember the density of water is 1.0 g/mL.
- How many grams of KClO₃ dissolve in 200 mL H₂O at 30°C?
- How many grams of KCl would dissolve in 40 mL H₂O at 80°C?
- How many grams of NH₃ would dissolve in 500 mL H₂O at 80°C?
- If 30 grams of KNO₃ are dissolved in 100 mL H₂O at 20°C, will the solution be saturated or unsaturated? Explain why.
- If a solution of NaNO₃ was cooled from 60°C to 10°C, how much solute would precipitate out of solution?



MOLARITY

- What is the molarity of a solution of Na₃PO₄ with 0.75 mol of solute in 950 mL of solution?
- What is the molarity of a solution containing 10.00 g of H₃PO₄ dissolved in 500.0 mL of solution?
- What mass of sodium chloride is needed to make 300.0 mL of a 0.50 M solution?
- How many liters of solution are needed to dissolve 25.5 g sodium chloride if a concentration of 0.25 M is needed?

MOLAR DILUTIONS

- You add 500.0 mL to 100.0 mL of a stock solution of 12 M HCl. What is the final concentration?
- To make 1000.0 mL of a 1.0 M dilution of phosphoric acid solution (H₃PO₄), what volume of 6.0 M stock solution should you use?
- If a 1000.0 mL dilute solution of CaCl₂ is made from 550.0 mL of 6.0 M stock solution, what is the concentration of dilute CaCl₂ solution?
- How would you prepare 90.0 mL of 2.0 M sulfuric acid from 18 M stock solution?

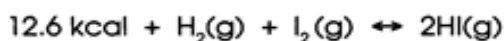
Chapter 18 – Reaction Rates & Equilibrium

RATES OF REACTION

1. What are the four factors that affect the rate of a chemical reaction?
2. Which of these statements is true?
 - a. Chemical reactions tend to slow down when the temperature rises.
 - b. Once a chemical reaction starts, the reacting particles no longer have to collide for products to form.
 - c. Increasing the total surface area of solid or liquid reactants increases the rate of the reaction.
3. Catalysts alter the rate of a chemical reaction by: (*this is a multiple choice question – select the best answer*).
 - a. increasing the number of collisions between reactant atoms.
 - b. increasing the kinetic energy of each reactant atom.
 - c. lowering the activation energy barrier.
 - d. being consumed in the reaction.

Le CHATELIER's PRINCIPLE

Use the following equation to complete the tables below with respect to the desired item – how does the stress effect concentration, pressure, and temperature.



Stress	Equilibrium Shift	[H ₂]	[I ₂]	[HI]	K
1. Add H ₂	right	_____	decreases	increases	remains the same
2. Add I ₂			_____		
3. Add HI				_____	
4. Remove H ₂		_____			
5. Remove I ₂			_____		
6. Remove HI				_____	
7. Increase Temperature					
8. Decrease Temperature					
9. Increase Pressure					
10. Decrease Pressure					

EQUILIBRIUM CONSTANT EXPRESSIONS

1. Write the equilibrium-constant expression for this reaction.
 $\text{CO}(\text{g}) + 2\text{H}_2(\text{g}) \rightleftharpoons \text{CH}_3\text{OH}(\text{g})$
2. Write the equilibrium-constant expression for this reaction.
 $\text{Fe}_3\text{O}_4(\text{s}) + 4\text{H}_2(\text{g}) \rightleftharpoons 3\text{Fe}(\text{s}) + 4\text{H}_2\text{O}(\text{g})$
3. An analysis of the equilibrium mixture in a 1-L flask shows 0.30 mol NOCl, 1.2 mol NO and 0.60 mol Cl₂. Calculate the value of K_{eq} for this reaction at equilibrium.
 $2\text{NOCl}(\text{g}) \rightleftharpoons 2\text{NO}(\text{g}) + \text{Cl}_2(\text{g})$
4. At 750°C, the following reaction reaches equilibrium in a 1-L flask. The reaction begins with 0.10 mol H₂ and 0.10 mol CO₂. At equilibrium there is 0.047 mol H₂O and 0.047 mol CO. Calculate K_{eq} for the reaction.
 $\text{H}_2(\text{g}) + \text{CO}_2(\text{g}) \rightleftharpoons \text{H}_2\text{O}(\text{g}) + \text{CO}(\text{g})$

Chapter 19 – Acids, Bases & Salts

VOCABULARY & CONCEPTS

1. An ionic compound that forms from an acid-base neutralization reaction is a(n) _____.
2. A(n) _____ is a substance that conducts electricity.
3. The reaction between an acid and a base is called a(n) _____.
4. According to Arrhenius, a compound containing hydrogen that ionizes to yield hydrogen ions in an aqueous solution is called a(n) _____.
5. According to Arrhenius, a compound that ionizes to yield hydroxide ions (OH^-) in an aqueous solution is called a(n) _____.

Write “A” if the statement is a property of an acidic solution. Write “B” if the statement is a property of a base, and “X” if it is a property of both a basic and acidic solution.

- | | |
|--|---|
| 6. Feels smooth and slippery _____ | 10. Has a sour taste _____ |
| 7. Reacts vigorously with metals _____ | 11. Turns litmus paper from blue to red _____ |
| 8. Has a bitter taste _____ | 12. Turns litmus paper from red to blue _____ |
| 9. Is an electrolyte _____ | 13. Usually does not react with metals _____ |

State “A” for acid, “B” for base and “S” for salt. In addition, write the name for the compound.

- | | |
|------------------------------------|------------------------------------|
| 14. HCl _____ | 18. NaOH _____ |
| 15. CaCl_2 _____ | 19. H_3PO_4 _____ |
| 16. Na_2SO_4 _____ | 20. $\text{Mg}(\text{OH})_2$ _____ |
| 17. HNO_3 _____ | 21. LiOH _____ |

ACID & BASE PROBLEMS

22. What is the pH of peaches if the $[\text{OH}^-] = 3.16 \times 10^{-11} \text{ M}$? Are peaches acidic, basic or neutral?
23. An aqueous solution contains a 0.0361 M OH^- concentration. Calculate the pOH, pH and $[\text{H}^+]$. Determine if the solution is acidic or basic.
24. Lake Ontario has water with an $[\text{H}^+]$ of approximately $1.1 \times 10^{-6} \text{ M}$. Determine whether the water is slightly acidic or slightly basic.
25. If the pH of a diet soda is 3.21 at 25°C , what are the hydrogen ion and hydroxide ion concentrations in the soda?
26. Most fish species die in water with a $[\text{H}^+]$ of between $3.16 \times 10^{-5} \text{ M}$ and $1.0 \times 10^{-5} \text{ M}$. What is the pH range where most fish species die? What are the corresponding $[\text{OH}^-]$ values for fish death?

TITRATION PROBLEMS

27. What is the molarity of carbonic acid if 25.0 mL of the solution is neutralized by 48.3 mL of 0.20 M NaOH?
28. What is the molarity of sodium hydroxide if 30.0 mL of the solution is neutralized by 40.0 mL of 0.50 M H_3PO_4 ?
29. How many milliliters of 1.0 M sulfuric acid are needed to neutralize 55 mL of a 0.75 M sodium hydroxide solution?