**Academic Chemistry Final 2015**

**Study Guide**

**Academic Chemistry Final**:

 **38 Multiple Choice Questions UPDATE**

 **18 Short Answer/Calculations**

**Resources for the final exam**

* You will be given a periodic table/ion chart and a formula sheet of equations.

**Formula Sheet:**

R = .0821 L • atm

  mol • K  22.4L in 1 mole at STP

PV = nRT STP = 273K and 1 atm

P1V1 = P2V2 Molarity = mol

 T1 T2 L

1 L = 1000 mL pH = -log [H+]

1 atm = 760 mmHg MAVA = MBVB

1 atm = 101.3 kPa

**Chapter 10: Stoichiometry**

**Vocabulary**

* law of conservation of matter
* molar ratios

**Be able to….**

* Determine molar ratios

**Practice Problems:**

1. Use the following balanced equation to answer questions

**2Al2(CO3)3 + 3H2SO4 🡪 2Al2(SO4)3 + 3 H2O + 3CO2**

* 1. \_\_\_\_\_\_\_\_\_ What is the molar ratio for Al2(CO3)3 and H2O?
	2. \_\_\_\_\_\_\_\_\_ How many moles of CO2 are produced when 3 moles of H2SO4 react?
	3. \_\_\_\_\_\_\_\_\_ How many grams of H2O are produced when 2.0g of H2SO4  reacts?

**Chapter 11: Heat & Energy**

**Vocabulary**

* heat
	+ temperature

**Be able to….**

* Identify exothermic vs endothermic reactions.
* Compare sources of energy for transportation, electricity, and heating.

**Practice Problems:**

2. Label each example as exothermic or endothermic

1. 2H2(g) + O2(g) → 2H2O(g) **ΔH°= -243 kJ** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. H2B4O7(s) → B2O3(s) + H2O(l) **feels warm** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. H2B4O7(s) + H2O(l) → 4HBO2(aq) + **11.3 kJ** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sources of energy:

1. What is the most common source of energy for transportation? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What are three alternatives?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which do you think is best? Explain two reasons: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is the most common source of energy for electricity? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What are three alternatives?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which do you think is best? Explain two reasons: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. What is the most common source of energy for home heating?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What are three alternatives?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**Chapter 12: Gases**

**Vocab:**

* Kinetic Molecular Theory
* Atmospheric pressure
* Temperature
* Kinetic Energy
* Pressure
* STP

**Be able to….**

* Compare/ contrast the characteristics of solids/ liquids/ gases
* Describe the Kinetic-Molecular theory and explain how it explains gas behavior.
* Explain what gas pressure means and describe how it is measured.
* Solve problems using the gas laws.

**Practice Problems:**

1. Compare the characteristics of solids/ liquids/ gases:



1. \_\_\_\_\_\_\_\_\_ A 3.00 liter sample of neon gas at 0°C and 1.25 atm is compressed into a 1.00 liter container. If the pressure remains constant, what temperature will the container be?
2. \_\_\_\_\_\_\_\_\_ What is the pressure exerted by 2 moles of oxygen at a volume of 500 mL at 20 °C?
3. \_\_\_\_\_\_\_\_\_ How many moles of gas are in a 52 L sample collected at 220 Kelvin and .444atm?
4. \_\_\_\_\_\_\_\_\_ Find the volume if a 2.1 L sample of a gas at 245 K and 2.1atm is changed to STP.
5. \_\_\_\_\_\_\_\_\_ Find the new volume of a gas that changes 65 ml at 150 mmHg to 425 mmHg.
6. Explain the relationship between each of the variables for the following gas laws:
	* Boyle’s Law
	* Charles’ Law
	* Avogadro’s Law

**Chapter 13: Solutions**

**Vocab**

* solute
* solvent
* saturated
* unsaturated
* supersaturated
* polar/non-polar
* soluble
* insoluble
* miscible
* immiscible
* solubility curve
* solution
* colloid
* suspension
* molarity

**Be able to…**

* + Identify mixtures as solutions, colloids, or suspensions
	+ Explain colligative properties and relate to practice applications
		- salting roads, ice cream
	+ Interpret a solubility curve
	+ Identify substances as saturated, unsaturated, or supersaturated
	+ Calculate molarity

**Practice Problems:**

1. Interpret solubility curves:



1. What substance is most soluble at 20oC?
2. What substance is least soluble at 90 oC?
3. What is the solubility of KNO3 at 50 oC?
4. How many grams of NaNO3 can dissolve in 100 grams of water at 60° C?
5. If 70g of KCl is dissolved at 70 oC, is the solution saturated, unsaturated, or supersatured?
6. \_\_\_\_\_\_\_\_\_ Calculate the molarity when 2 mol of CuSO4 dissolves in 6L of water.
7. \_\_\_\_\_\_\_\_\_ Find the molarity when 2.0 mol NaCl is dissolved in 2500mL of water.
8. \_\_\_\_\_\_\_\_\_ How many moles of HCl is needed to prepare 1.5 L of a 0.010 M solution.

**Chapter 15: Acids and Bases:**

**Vocabulary**

* Arrhenius Acid
* Arrhenius Base
* dissociation
* titration

**Be able to…**

* Identify substances in chemical equations as acids or bases
* Identify the common physical and chemical properties of acids and bases
* Calculate pH of solutions

**Practice Problems:**

1. Label the properties of acids and bases:

|  |  |  |
| --- | --- | --- |
|  | **Acids** | **Bases** |
| Dissociates into \_\_\_\_ ions |  |  |
| pH range? |  |  |
| Taste? |  |  |
| Feels? |  |  |
| Conducts Electricity? |  |  |
| Turns litmus paper red/blue |  |  |
| Turns Phenolphthalein clear/pink |  |  |

1. \_\_\_\_\_\_\_\_\_ Find the pH of a 1.0 x 10-3 M solution of HCl
2. \_\_\_\_\_\_\_\_\_ Find the pH of a NaOH solution where H+ = [1.0 x 10-8]

**Chapter 16: Reaction Rates**

**Vocabulary**

* Collision Theory
* Catalyst

**Be able to…**

* Describe the two conditions for a successful chemical reaction
* Understand chemical reactions in terms of collision theory
* Be able to list and describe the 5 factors that affect reaction rates
* Interpret potential energy diagrams

**Practice Problems:**

1. What are the conditions for a chemical reaction to occur?
2. Explain how the following factors change reaction rates:
* surface area of a solid reactant
* concentration or pressure of a reactant
* temperature
* nature of the reactants
* presence of a catalyst