CHEMISTRY I – FINAL EXAM REVIEW – SPRING 2017

**STRATEGY**: Start by reading through your notes to refresh your memory on these topics. Then, use this review sheet as a starting point to identify the areas on which you need to spend more study time. For those areas, go back to homework assignments, quizzes, and reviews to practice more problems. Keep in mind that these questions are only samples and do not include specific examples of how vocabulary and other conceptual information might appear in a bubble format. Remember you can access notes and reviews under Lecture Notes on the website (most of the time, as we know sometimes I forget)

**FORMAT**:

* Questions will include multiple-choice and some problems.
* A formula bank will be provided in addition to any values that you might need, but you will NOT be given “formulas” for items listed in the vocab sections (molarity, % composition, etc).

# The Mole – Ch. 10

1. How many magnesium sulfate molecules are in 25.0 g?
2. Find the molarity of a 750 mL solution containing 346 g of potassium nitrate.
3. Calculate the number of grams required to make a 50.0 mL solution of 6.0*M* NaOH.
4. Find the % composition of copper(II) chloride.
5. The percent composition of a compound is 40.0% C, 6.7% H, and 53.7% O. The molecular mass of the compound is 180.0 g/mol. Find its empirical and molecular formulas.

**VOCAB**: Avogadro’s number

 percent composition

 molarity

# Chemical Reactions – Ch. 11

1. Write a word equation for the following reaction (incl. how many? of what? what state?).

*Ba(ClO3)2(s) BaCl2(s) + 3O2(g)*

1. Rewrite and balance the following word equation using chemical formulas, physical states, and energy. – *When solid sodium chlorate absorbs energy, it produces solid sodium chloride and oxygen gas*.

Predict the products and balance

1. Cu(s) + MgSO4(aq) →
2. C5H12(l) + O2(g) →
3. NH4Cl(aq) + Pb(NO3)2(aq) →
4. Fe2O3(s) →
5. For each of the previous reactions, specify whether it is *combustion*, *synthesis*, *decomposition*, *single* *replacement*, or *double* *replacement*.
6. List two conditions required for a successful collision according to Kinetic Molecular Theory.
7. Name four ways to increase the rate of a reaction.

**VOCAB**: endothermic

 exothermic

 catalyst

# Stoichiometry – Ch. 12

1. How many grams of copper would be produced from 49.48 g of chromium? Cr + CuSO4 → Cu + Cr2(SO4)3
2. How many grams of chromium are required to react with 125 mL of 0.75*M* CuSO4. (same reaction as previous problem)
3. How many grams of ZnS are required to react with 12.6 L of oxygen gas at STP? ZnS + O2 → ZnO + SO2

**VOCAB**: theoretical yield limiting reactant

 percent yield excess reactant

# Gases – Ch. 16

Identify the gas laws that explain these situations (18-20). Specify the variables involved and direct/inverse relationship.

1. A balloon pops after floating high into the atmosphere.
2. A balloon pops in a hot car on a summer day.
3. Do not store aerosol cans at temperatures above 120°F. Danger of explosion.

Identify the gas law and solve the problem (18-21).

1. A jar is tightly sealed at 22°C and 772 torr. What is the pressure inside the jar after it has been heated to 178°

# Gases – Ch. 10 & 11 (continued)

1. 300.0 mL of gas has a pressure 75.0 kPa. When the volume is decreased to 125.0 mL, what is its pressure?
2. 50.0 L of gas has a temperature of 75°C. What is the temp in Celsius when the volume changes to 110 L?
3. What is the volume of a container that holds 48.0 g of helium at a pressure of 4.0 atm and temperature of 52°C?
4. A gas occupies 325 L at 25°C and 98.0 kPa. What is its volume at 70.0 kPa and 15°C?
5. Define real gases. When do they act like ideal gases?

**VOCAB**: Kelvin

 STP

# Nuclear Chemistry – Ch. 22

Match each description with the appropriate type of radiation – alpha, beta, positron, or gamma (27-31).

1. A negatively charged electron.
2. Blocked only by several feet of concrete.
3. A positively charged particle stopped by lead.
4. Blocked by paper or clothing.
5. Radiation energy with no electrical charge.

Write equations for the nuclear decay reactions in 32-35.

1. Decay of polonium-218 by alpha (α) emission.
2. Decay of sodium-22 by electron capture.
3. Decay of carbon-14 by beta (β-) emission.
4. Decay of chlorine-32 by positron (β+) emission.
5. Carbon-14 has a half-life of 5,730 years. If a plant contained 2.0 g of 14C when it died, how much is left after 34,380 years?

**VOCAB**: half-life fission vs. fusion mass defect critical mass

 nuclear binding energy chain reaction

CHEMISTRY I – FINAL EXAM REVIEW – 2017

 ANSWER KEY

1. 1.25 × 1023 molecules MgSO4
2. 4.6*M* KNO3
3. 12 g NaOH
4. 47.27% Cu, 52.73% Cl
5. empirical formula – CH2O, molecular formula – C6H12O6
6. One unit of solid barium chlorate when heated produces one unit of solid barium chloride and three molecules of oxygen gas.
7. 2NaClO3(s) *2*NaCl(s) + 3O2(g)
8. Cu(s) + MgSO4(aq) → N.R.
9. C5H12(l) + 8O2(g) → 5CO2(g) + 6H2O(g)
10. 2NH4Cl(aq) + Pb(NO3)2(aq) → 2NH4NO3(aq) + PbCl2(s)
11. 2Fe2O3(s) → 4Fe(s) + 3O2(g)
12. single replacement, combustion, double replacement, decomposition
13. particles must collide, they must collide at the proper orientation, they must collide with sufficient KE
14. increase the surface area by grinding or dissolving the solid in water, increase the concentration of the reactants, increase the temperature of the reactants, use a catalyst
15. 2Cr + 3CuSO4 → 3Cu + Cr2(SO4)3, 90.71 g Cu
16. 3.3 g Cr
17. 2ZnS + 3O2 → 2ZnO + 2SO2, 36.5 g ZnS
18. Boyle’s Law, P&V, inverse
19. Charles’ Law, V&T, direct
20. Gay-Lussac’s Law, P&T, direct
21. Dalton, 75.5 kPa
22. Boyle, 180. kPa
23. Charles, 490°C
24. Ideal, 80. L
25. Combined, 440. L
26. Real gas molecules have a volume and attract each other. They act ideal at high temperatures and low pressures.

0.112353 amu, 1.68 × 10-11 J

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| --- | --- |
| 1. beta
2. gamma
3. positron
 | 1. alpha
2. gamma
 |
| 1.
2.
 |  |

1. 0.63 g