**Chemistry Final Exam Study Guide**

**Unit 7 Review – Nuclear Chemistry**

1. What are the types of nuclear particles?
2. Predict the products of beta-particle emission, alpha decay, and electron capture.
3. Calculate the half-life of nuclear decay , or given the half-life, calculate the amount remaining.

**Unit 8 Review – Reaction Prediction**

1. Looking at the solubility chart and rules, which salts will **NEVER** form a precipitate?
2. Which three metals often form salts that will **NOT** dissolve?
3. Indicate the **type** of reactions seen below.
   1. FeCO3 🡪 FeO + CO2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. C3H8  + 5O2 🡪3CO2 + 4H2O \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. 2Cu + S 🡪Cu2S \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Li3PO4 + Al2(SO4)3 🡪\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   5. HCl + NaOH 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   6. Na + Zn(NO3)2 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. Which of the halogens is the most reactive? Least?
5. What is a catalyst? Where is it written in a balanced equation?
6. The activity series of metals is used to determine if what type of reaction will take place?

**Unit 9 Review – Measurement**

1. Write numbers using scientific notation or decimal notation.
2. Count the number of significant figures in a measurement and round calculated values to the appropriate number of sig-figs.
3. Convert among metric units. Use simple T-Tables to convert lbs to kg or meters to miles.
4. Use percent error to describe the accuracy of a measurement or calculated value.

Three students made multiple weighings of a sample of aluminum, each using a different balance. The correct mass of the sample had previously been determined to be 55.55g. Select the accuracy and precision of each student's measurements.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Fred | Ethel | Ricky |
| Weigh 1 | 55.56g | 58.83g | 57.72g |
| Weigh 2 | 55.54g | 58.80g | 58.44g |
| Weigh 3 | 55.54g | 58.82g | 54.23g |
| Weigh 4 | 55.55g | 58.81g | 56.66g |

|  |
| --- |
| Ricky’s measurements are:  Fred’s measurements are: |
| Ethel’s measurements are: | |

1. Both Accurate and Precise
2. Accurate but not Precise
3. Precise but not Accurate
4. Neither Accurate nor Precise

**Unit 10 Review – Moles**

1. In the table below, classify the type of substance (ionic, molecular, metallic, or acid) and give the name or formula and number of atoms.

|  |  |  |  |
| --- | --- | --- | --- |
| **Particle** | **Classification** | **Name/Formula** | **Number of Atoms** |
| NaCl |  |  |  |
| Copper |  |  |  |
| Sulfuric Acid |  |  |  |
| CO2 |  |  |  |
| Oxygen |  |  |  |
| N2O5 |  |  |  |
| KF |  |  |  |
| HCl |  |  |  |
| Br2 |  |  |  |
| MgSO4 |  |  |  |

1. What is Avogadro’s Number including units?
2. Give the SI unit for distance, mass, volume, time, and amount of substance
3. Determine the approximate Molar Mass of Ca(C2H3O2)2
4. How many moles are in 2.0 g of Barium Phosphate?
5. What is STP? Make sure to give the values
6. How many liters are in 1 mole?
7. What is the density of Krypton at STP?

**Unit 11 Review – Stoichiometry**

1. Define stoichiometry.
2. Define limiting reagent.
3. How many moles of oxygen are necessary to react completely with four moles of propane (C3H8)?

\_\_C3H8 + \_\_O2 🡪 \_\_CO2 + \_\_H2O

1. C2H4(g) + 2O2(g) → 2CO(g) + 2H2O(g)
   1. The equation above shows the incomplete combustion of ethene. If 2.70 mol C2H4 is reacted with 6.3 mol O2. Identify the limiting reagent.
   2. Calculate the moles of water produced.
   3. What is the percent yield if 4.24 g of 2CO is produced when 2.7 g of C2H4 reacts with excess O2?
2. Complete and balance the following reaction, write a net ionic equation, and identify the spectator ions (5pts):

K2SO4 (aq) + BaCl2 (aq) 🡪

**Unit 12 Review – Gases**

1. Explain in detail kinetic molecular theory. What happens to the particles when a hot air balloon takes flight?
2. What is the SI unit of pressure?
3. Explain how atmospheric pressure varies with altitude.
4. What is the cause of gas pressure in a closed container?
5. Define both the critical point and the triple point. Interpret a phase-change diagram
6. Define the following terms, write the formula, and give an example of how this law is exhibited in real life situations:
   1. Boyle’s Law
   2. Charles’ Law
   3. Gay-Lussac’s Law
   4. Ideal Gas Law
   5. Partial Pressure
   6. Dalton’s Law

28. Define the following terms:

a. Evaporation

b. Vaporization

c. Melting Point

d. Sublimation

e. Condensation

**More Practice Problems: Be sure to include units and show all your work**

29. Lr-257 has a half life of 8 seconds. What % of a sample will remain 32 seconds after it is made?

30. Co + n → Mn + ⬜

31. For most airlines your luggage has to be 23 kilograms or less or you have to pay a fee. If your bag is 21000 g, how many kilograms is this and will you have to pay a fee?

32. A new car was recently tested to have a maximum speed of 64.8 meters/second. What is the speed in meters/second? (make sure you have the correct number of sig figs!)

*33. Use the following information to answer the next two questions.*

A cube of a gold-colored metal with a volume of 52.5 cm3 has a mass of 1010 g.

Therefore the density (density = mass/volume) of this metal is calculated to be 19.2 g/cm3

The density of pure gold is 19.3 g/cm3.

1. What is the percent error of the gold-colored metal’s density to pure gold’s density?
2. Is the metal pure gold? Justify your answer.

34. Find the mass in grams of 2.56  1023 molecules of O.

35. a) Determine the empirical formulas of a substance that contains 75.0% Carbon and 25.0% Hydrogen. b) determine the molecular formula of the compound if the mass is 46g.

36. Write the net ionic equation for the following reaction. Be sure to identify the spectator ions.

AlCl3 ( )+ AgNO3 ( ) → Al(NO3)3 ( ) + AgCl ( )

37. How many grams of CO are needed to produce 150.8 g Fe?

Fe2O3 (*s*) + 3CO(*g*) 3CO2 (*g*) + 2Fe(*s*)

38. For the reaction 2Na(*s*) + Cl2 (*g*)  2NaCl(*s*), how many grams of NaCl could be produced from 113 g of Na and 11 L of Cl2 (at STP)?

39. A rigid container of O2 has a pressure of 240 kPa at a temperature of 513 K. What is the pressure at 273K?

40. What is the pressure exerted by 23 g of O2 in a 25.0-L container at 35.0C?