Exam 1

# Part 1: Multiple Choice (2 points each)

## Directions: Please circle the *best* answer for each of the following questions.

1. What is the precision of the graduated cylinder?
   1. ± 1 mL
   2. ± 0.1 mL
   3. ± 0.01 mL
   4. 23.2 mL
   5. 9.3 mL
2. When recording data in your lab notebook, which of the following is an acceptable way to correct a mistake?
   1. whiteout
   2. erasing
   3. obliterating
   4. writing over the mistake
   5. none of the above
3. What is the measurement shown by the calipers?
   1. 24 mm
   2. 27.4 cm
   3. 28.4 cm
   4. 29 cm
   5. 30.4 cm



1. Which statement best explains the difference between a law and a theory?
   1. A theory describes what nature does; a law describes why nature does it.
   2. A law summarizes a series of related observations; a theory gives the underlying reasons for them.
   3. A law is truth; a theory is mere speculation.
   4. all of the above
   5. none of the above
2. When multiplying or dividing measured quantities, what determines the number of significant figures in the result?
   1. The quantity with the fewest number of significant figures.
   2. The quantity with the largest number of significant figures.
   3. The quantity with the fewest number of decimal places.
   4. The quantity with the largest number of decimal places.
   5. The quantity with the largest number of zeros.
3. Indicate the number of significant figures 11.4 g/cm3 (density of lead).
   1. 1
   2. 2
   3. 3
   4. 4
   5. Unlimited number of significant figures
4. Colorful, poor conductor of heat and electricity, dull best describes which element?
   1. Copper, Cu
   2. Tin, Sn
   3. Sulfur, S
   4. Lithium, Li
   5. Boron, B
5. Which of the following applied to the electron?
   1. Mass ≈ 1 u
   2. Mass ≈ 0 u
   3. Mass ≈ 12 u
   4. Charge = 0
   5. Charge = +1
6. Complete the following conversion: 1 L = \_\_\_\_\_\_mL
   1. 1
   2. 10
   3. 100
   4. 1,000
   5. 10,000
7. The mass of an average atom of a certain element is 5.30 times as great as the mass of an atom of carbon-12. Identify the element.
   1. H
   2. C
   3. F
   4. Cu
   5. Zn

# Part 2: Short Answer

## Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work.

1. Answer the following questions about the combustion reaction below (6 points):

2 C2H6 (g) + 7 O2 (g) → 4 CO2 (g) + 6 H2O (g) + energy

* 1. Identify each of the following as a reactant or product:
     1. CO2 (g) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     2. O2 (g) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     3. C2H6 (g) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     4. H2O (g) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. When the reaction takes place is energy absorbed or released? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  3. Is the reaction exothermic or endothermic? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Define and draw a picture that represents a (6 points)
   1. Pure substance
   2. Heterogeneous mixture
2. What is the difference between a physical property and a chemical property? Give an example of each (5 points).
3. A bullet is traveling 922 miles/hour. How fast is it going in m/s (8 points)?
4. Calculate the number of mm in 1.75 miles (8 points).
5. If the walls in a room are 955 square feet in area, and a gallon of paint covers 15 square yards, how many liters of paint are needed for the room (8 points)?
6. The melting point of sodium chloride, NaCl, table salt is 1474 °F (6 points).
   1. What is the melting point in degrees Celsius?
   2. The temperature scale of Rankine is used in many engineering fields in the United States to measure thermodynamic temperature. Just like the Kelvin scale, zero on the Rankine scale represents absolute zero. The conversion between Rankine and Fahrenheit is:

°R = °F + 459.67

What would the melting point of salt in Rankine?

1. The most abundant isotope of lead is 208Pb (9 points).
   1. In the atom there are \_\_\_\_\_ protons, \_\_\_\_\_ neutrons, and \_\_\_\_\_ electrons
   2. What is the symbol of an isotope of lead with 132 neutrons? Write the nuclear symbol in the form:
   3. What is the name and symbol of an isotope with the same mass number as in part b and 131 neutrons?
2. Suppose you want to turn atoms of lead into atoms of gold. What would you have to do to the nucleus of the lead atoms (4 points)?
3. A certain element consists of two stable isotopes. The first has an atomic mass of 68.9257 u and a percent natural abundance of 60.40%. The second has an atomic mass of 70.9249 u (10 points).
   1. What is the percent abundance of the second isotope?
   2. What is the atomic mass of the element?
   3. What is the name and symbol of the element? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. In an experiment similar to part 1 of the Mass, Volume, Density experiment the following data was collected (10 points).
   1. Complete the table below:

|  |  |
| --- | --- |
| Mass of beaker and solution | 125.447 g |
| Mass of beaker | 99.887 g |
| Mass of solution |  |
| Volume of solution | 24.3 mL |
| Density of solution |  |
| Actual Value | 1.034 g/mL |
| Percent error |  |

* 1. If some of the solution spilled before the volume was measured, how would that change the density (too high, too low, unchanged)? Explain your answer.