Exam 1

# Part 1: Multiple Choice (2 points each)

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

1. A quantitative observation is known as
	1. a hypothesis
	2. an experiment
	3. a theory
	4. a measurement
	5. a law
2. What is the largest category or grouping of elements in the periodic table?
	1. Nonmetals
	2. Halogens
	3. Metals
	4. Alkali metals
	5. Post transition Metals
3. Which of the following has a fixed volume and can flow?
	1. Water
	2. Marble
	3. Nitrogen
	4. Air
	5. Sugar
4. Which of the following is not a physical property?
	1. Liquid
	2. Density
	3. Ability to react with chlorine
	4. Ability to dissolve in water
	5. Boiling point
5. Which of the following is one of the five traditional branches of Chemistry?
	1. Inorganic
	2. Organic
	3. Biochemistry
	4. Physical Chemistry
	5. all of the above
6. To how many significant figures should each answer be rounded?
	1. 1 significant figure
	2. 2 significant figures
	3. 3 significant figures
	4. 4 significant figures
	5. 5 significant figures
7. In order to avoid exposure to your eyes in a chemistry lab you should wear eye protection
	1. only when working with corrosive chemicals.
	2. only when your instructor requires it.
	3. only when there are other students working nearby who might do something stupid.
	4. never, they are not necessary.
	5. whenever anyone is working with chemicals or flames.
8. Which of the following mixtures could be mostly separated by use of evaporation?
	1. Sand and salt
	2. Salt and water
	3. Sand and water
	4. Ball bearings and water
	5. b and c
9. Which metric system prefixes is correctly paired with its mathematical meaning?
10. kilo and 101
11. milli- and 10-2
12. micro- and 10-6
13. giga and 10-9
14. deci and 105
15. Consider the following periodic table.

In what numbered section would the post transition metals be found?

|  |  |  |
| --- | --- | --- |
|   | a.  | 1 |
|   | b.  | 2 |
|   | c.  | 3 |
|   | d.  | 4 |
|   | e.  | 5 |

1. The meter stick in the image is being used to measure the length of a piece of wood. How long is the piece of wood?
	1. 30.43 cm
	2. 34.2 cm
	3. 34.0 cm
	4. 40.0 cm
	5. none of the above

# 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. Consider each of the following statements and determine whether it represents an observation, a hypothesis, a theory, or a scientific law (3 points):
	1. A pure substance has a definite, fixed composition. law
	2. The air feels warm. observation
	3. The battery in my watch must be dead since it is no longer keeping time. hypothesis
2. Classify each of the following elements as a metal, metalloid, or nonmetal (5 points):
	1. Bi \_\_\_\_\_\_\_metal\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Xe \_\_\_\_\_\_\_nonmetal\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. Si \_\_\_\_\_\_\_metalloid\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. Oxygen \_\_\_\_\_\_\_nonmetal\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	5. Copper \_\_\_\_\_\_\_metal\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. If 1.4% of the mass of a human body is calcium, how many kilograms of calcium are there in a 180 pound man (8 points)?
4. A bullet is traveling 922 miles/hour. How fast is it going in m/s (8 points)?
5. Classify each of the following as a mixture or pure substance, then further classify each mixture as heterogeneous or homogeneous, and each pure substance as a compound or element (8 points).
	* + - 1. chlorine gas pure substance 🡪 element
				2. pizza mixture 🡪 heterogeneous
				3. isopropyl alcohol pure substance 🡪 compound
				4. salt water mixture 🡪 homogenous
6. Classify each of the following changes as endothermic or exothermic with respect to the underlined substance (3 points):
	* + - 1. Boiling water \_\_\_\_\_\_\_\_\_\_endothermic\_\_\_\_\_\_\_\_\_
				2. Hard boiling an egg \_\_\_\_\_\_\_\_\_\_endothermic\_\_\_\_\_\_\_\_\_\_
				3. Burning leaves \_\_\_\_\_\_\_\_\_\_exothermic\_\_\_\_\_\_\_\_\_\_\_
7. Explain how an ocean of water and a cup of the same ocean water can have the same temperature, but contain different amounts of heat (4 points).

Temperature is the average kinetic energy of the molecules in a sample. If both samples have the same temperature they consist of molecules with the same average kinetic energy. The sample with more molecules, the ocean, must have the greater total amount of energy.

1. Are the following statements about Dalton’s Atomic Model, Thomson’s Plum Pudding Model, and the Nuclear Model of the Atom true or false (5 points)?

|  |  |  |
| --- | --- | --- |
|  | Electrons are not part of Dalton’s Atomic Model.  | True |
|  | In the Plum Pudding Model protons are scatted throughout the negative mass of matter in an atom.  | False |
|  | In the Nuclear Model electrons are located in the nucleus of the atom.  | False  |
|  | In the Nuclear Model atoms are mostly empty space.  | True  |
|  | In all three models atoms are roughly spherical.  | True  |

1. Antimony, Sb, has two main isotopes and an atomic mass of 121.7601 amu. Antimony-121 is the most abundant at 57.21% with a mass of 120.9038 amu (8 points).
	1. What is the percent abundance of antimony-123?
	2. Calculate the mass of antimony-123.

mSb-123 = 122.9 amu this is antimony-123

1. Complete the following table (9 points):

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Atomic | Atomic | Mass  | Number of | Number of | Number of  |
|  | Notation | Number | Number | Protons | Electrons | Neutrons |
|  | **7834Se2-** |  **34** | 78 | 34 | 36 |  **44** |
|  | Xe-131 |  **54** | 131 |  **54** | **54**  |  **77** |
|  | **120**50Sn4+ | 50 | **120**  |  **50** |  **46** | 70 |

1. In an experiment similar to part 1 of the Mass, Volume, Density experiment the following data was collected (12 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.

The volume would be smaller than it should be. Therefore, the density would be higher because density is inversely proportional to volume.

1. Label each of the following pieces of laboratory glassware with their correct names: crucible tongs; evaporating dish; scoopula; Erlenmeyer flask; beaker (5 points).



Erlenmeyer flask beaker scoopula evaporating dish crucible tongs flask