Exam 1

# Part 1: Multiple Choice (2 points each)

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

1. John Dalton postulated that all matter is composed of small particles called atoms. For this proposition to be considered a valid scientific theory,
	1. it must be supported by experimental evidence and testing.
	2. it must be impossible to prove wrong by experiment.
	3. all possible experiments must never find an exception to it.
	4. some, but only a few, experiments may find exceptions to it.
	5. it must be voted on by the scientific community and accepted by all.
2. Which particle-level diagram is the best representation for a  atom?



a.  c. 

b.  d. 

e. none of the above

1. Elements in group 18 (VIIIA) are called
	1. alkali metals
	2. alkaline earth metals
	3. halogens
	4. chalcogens
	5. noble gases
2. Name the term for the energy associated with the heat.
	1. Kinetic energy
	2. Potential energy
	3. Mechanical energy
	4. Electrical energy
	5. Thermal energy
3. Extraction is
	1. a process in which the more volatile liquid is boiled off.
	2. dissolving a liquid or solid with a liquid to remove another solid/liquid that dissolves in that liquid.
	3. separating a solid from a liquid by pouring off the liquid.
	4. pouring a mixture through a filter paper to separate the solid from the liquid.
	5. heating a mixture of two solids to fuse them together.
4. How many electrons can be contained in the following figure:
	1. s orbital
	2. p orbital
	3. 2 electrons
	4. 6 electrons
	5. b and d
5. What is the chemical symbol for the iron(III) ion?
	1. Fe2+
	2. Fe3+
	3. ferric ion
	4. ferrous ion
	5. F3+
6. On the electromagnetic spectrum, visible light is immediately between two other wavelengths. Name them.
	1. infrared and x-ray
	2. radio and microwave
	3. gamma ray and ultraviolet
	4. microwave and x-ray
	5. infrared and ultraviolet
7. Manganese, gold, tungsten, and yttrium are all classified as
	1. alkali metals
	2. alkaline earth metals
	3. transition metals
	4. inner transition metals
	5. transuranium elements
8. Name the piece of equipment:

* 1. Graduated cylinder
	2. Erlenmeyer flask
	3. Scoopula
	4. Beaker
	5. Watch glass

# 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. An irregularly shaped metal object with a mass of 25.43 g was placed in a graduated cylinder with water. The before and after volumes are shown below (8 points).
	1. What is the volume of the metal object?
	2. What is the density of the metal?
	3. If the actual density of the metal is 2.82 g/mL, what is the percent error?
2. What is the difference between weight and mass (3 points)?
3. How might you use filtration to separate a mixture of salt and sand (3 points)?
4. List all of the physical properties and changes in the following statement: “The temperature of the land is an important factor for the ripening of oranges, because it affects the evaporation of water and the humidity of the surrounding air.” (3 points)
5. Write the nuclear symbol, $$, for each of the following isotopes (8 points):
	1. a nitrogen atom with 8 neutrons. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. an atom with 20 protons, 22 neutrons, and 18 electrons \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. an atom with mass number 27 and 14 neutrons \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. an oxide ion with 9 neutrons \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. Consider three elements with the following noble gas notations (8 points):

 X = [Ar] 4s2; Y = [Ne] 3s23p4; Z = [Ar] 4s23d104p4

* 1. Identify each element: X = \_\_\_\_\_\_\_, Y = \_\_\_\_\_\_\_, Z = \_\_\_\_\_\_\_\_\_
	2. Which element has the largest atomic radius? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. Which elements have similar properties? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. Which element has the highest ionization energy? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	5. Which element has the most metallic character? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
1. A bullet is traveling 922 miles/hour. How fast is it going in m/s (8 points)?
2. The density of air at ordinary atmospheric pressure and 25 °C is 1.19 g/L. What is the mass, in kilograms, of the air in a room that measures 12.5 ft x 15.5 ft x 8.0 ft (8 points)?
3. The results from Thomson’s cathode-ray tube experiment led to the discovery of which subatomic particle (2 points)?
4. Complete the following table (24 points):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Name | Cation | Anion | Formula  |
|  | Xenon trioxide | -------------------- | -------------------- |  |
|  | Zinc nitride |  |  |  |
|  |  |  |  | KBr |
|  | Hydrogen fluoride |  |  |  |
|  |  | Na+ | H- |  |
|  |  |  |  | BaI2 |
|  | Lithium sulfide |  |  |  |
|  | Ammonia  | ------------------- | -------------------- |  |
|  | Diphosphorus tetrachloride | ------------------- | ------------------- |  |
|  |  | -------------------- | --------------------- | CO |
|  |  | -------------------- | --------------------- | N4Se4 |

1. Arrange the following steps in the scientific method in the sequence in which they normally occur (5 points).
	1. Suggest probable explanations for generalizations obtained from data.
	2. Collect data concerning a problem through observation and experimentation.
	3. Identify a problem, and carefully plan procedures to obtain information about all aspects of this problem.
	4. Experiment further to prove or disprove explanations.
	5. Analyze and organize data in terms of general statements that summarize experimental observations.