Exam 1

# Part 1: Multiple Choice (2 points each)

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

1. Which of the following is an example of a hypothesis?
	1. The mass of products obtained in a chemical reaction always equals the mass of the substances that react.
	2. Zinc reacts with hydrochloric acid but copper doesn’t because zinc is more reactive than copper.
	3. Silver tarnishes.
	4. Oil and water don’t mix.
	5. All matter is composed of atoms.
2. Decanting is
	1. a process in which the more volatile liquid is boiled off.
	2. dissolving a solid into a 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.
3. The lowest possible energy level for an electron is known as a
	1. low state.
	2. basement state.
	3. ground state.
	4. excited state.
	5. energy state.



1. The following figure show a(n):
	1. s orbital
	2. p orbital
	3. d orbital
	4. f orbital
	5. none of the above
2. A physical change
	1. occurs when iron rusts.
	2. occurs when sugar is heated into caramel.
	3. occurs when glucose is converted into energy within your cells.
	4. occurs when water is evaporated.
	5. occurs when propane is burned for heat.
3. The mass number is equal to
	1. the sum of the number of electrons and protons.
	2. the sum of the number of neutrons and electrons.
	3. the sum of the number of protons, neutrons, and electrons.
	4. the sum of the number of protons and neutrons
	5. the difference of the number of protons and electrons.
4. Which of the following does not describe a metal?
	1. Found in the upper left hand corner of the periodic table.
	2. Good conductor of electricity.
	3. Nonmetals are generally unreactive.
	4. Good conductor of heat.
	5. Tend to lose electrons.



1. What is the distance measured by the calipers?
	1. 10.2 mm
	2. 13.2 mm
	3. 13.24 mm
	4. 13.9 mm
	5. 30.9 mm

1. Analysis of carbon-14 content is used to date fossils up to about 60,000 years old. There are two other naturally occurring isotopes of carbon, 12C and 13C. Given the relative atomic mass of carbon, 12.01 amu, which is the most likely abundance of carbon-14 in nature:
	1. Approximately 99%
	2. Approximately 50%
	3. Approximately 33%
	4. Approximately 10%
	5. Less than 0.1%
2. In the physical properties experiment which substance(s) were liquids?
	1. Mercury
	2. Bromine
	3. Water
	4. all of the above
	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. How might you use filtration to separate a mixture of salt and sand (3 points)?
2. A bullet is traveling 412 m/s. How fast is it going in miles/hour (8 points)?
3. If the temperature of a cup of coffee decreases from 60.0 °C to 25.0 °C, what is the decrease in temperature (4 points)
	1. in Celsius?
	2. in Kelvin?
4. Identify each as a mixture or pure substance (4 points).
	1. Gold (Au) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. Alcoholic drink \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. Elemental oxygen \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. Saline solution \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. What kind of light would atoms emit if the electron energy were not quantized (3 points)?
6. One of the successes of the Bohr model of the atom was its explanation of the lines in atomic spectra. Does the quantum mechanical model also have a satisfactory explanation for these lines? Justify your answer (3 points).

|  |  |
| --- | --- |
| Metal | Density (g/mL) |
| Gold | 19.3 |
| Silver | 10.5 |
| Copper  | 8.96 |
| Lead | 11.3 |

1. You buy an ingot of silver off of the internet. Given the current price of silver you want to make sure that it is real. You decide to determine the density use the method of water displacement of the ingot and compare it to the density of silver. The ingot has a mass of 539.823 g. The initial volume of the water is 49.64 mL and after the ingot was added the volume is 102.51 mL. The density of some metals are given (10 points).
	1. What is the volume of the ingot?
	2. What is the density of the ingot?
	3. Is the ingot likely to be silver? \_\_\_\_\_\_\_\_\_\_\_\_
	4. What is the percent error?
2. Circle the best choice for each (5 points)
	1. Larger atomic radius? Ca or Ca2+
	2. Less metallic Na or Cl
	3. Smaller ionization energy? F or Cs
	4. Larger atomic radius? S or S2-
	5. Higher energy Gamma rays or radio waves
3. Complete the following table (8 points):

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

1. Complete the following table (24 points):

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Name | Cation | Anion | Formula  |
|  | Sodium oxide |  |  |  |
|  |  |  |  | AlP |
|  | Potassium hydride |  |  |  |
|  | Zinc fluoride |  |  |  |
|  |  | Ca2+ | N3- |  |
|  |  | ------------------- | ------------------ | CO |
|  | Diphosphorus tetrachloride | --------------------- | ------------------ |  |
|  |  | ------------------ | ------------------- | H2O  |
|  | Manganese(III) carbide |  |  |  |
|  |  |  |  | HBr |

1. What is the name and symbol of the elements that have the following electron configurations (8 points)?
	1. 1s2 2s2 2p6 3s2 3p2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. [Xe] 6s2 4f14 5d10 6p2 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. 1s2 2s2 2p6 3s2 3p6 4s2 3d6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. [Rn] 7s2 5f3 6d1 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_