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 conversion factors is incorrect?
	1. 1 microliter/1000 nL
	2. 1 cg/100 g
	3. 1 L/1000 mL
	4. 1000 m/1 km
	5. 1 kg/10000 dg
2. Which of the following is an element?
	1. Brass
	2. Salt
	3. Water
	4. Earth
	5. Oxygen
3. Which of the following is a chemical change?
	1. Boiling a liquid.
	2. Melting a solid.
	3. Condensing a gas.
	4. Freezing a liquid.
	5. Burning a liquid.
4. How many significant figures are in the number 34.00500?
	1. 3
	2. 4
	3. 5
	4. 6
	5. 7
5. Which electron configuration indicates a transition metal?
	1. 1s22s22p63s13p6
	2. 1s22s22p63s13p64s23d3
	3. 1s22s22p5
	4. 1s22s22p63s13p64s23d104p2
	5. none of the above
6. Which of the following is an SI unit for expressing the mass of a block of Au?
	1. m
	2. pound
	3. g
	4. L
	5. Kelvin
7. Rank the following from smallest to largest atomic radius.
	1. O, Zn, Ca, Ba
	2. O, Ca, Zn, Ba
	3. Ba, Ca, Zn, O
	4. O, Zn, Ba, Ca
	5. Ca, Ba, Zn, O
8. 454.0 °F is equivalent to
	1. 270.0 °C
	2. 234.4 °C
	3. 759.6 °C
	4. 874.8 °C
	5. 252.2 °C
9. 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
10. Consider the following periodic table.



In what numbered section would the elements used in semiconductors be found?

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

# 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. Complete the following statements (6 points):
1. The atomic number gives the number of \_\_\_\_protons\_\_\_\_\_\_\_\_ in the nucleus.
2. In an atom, the number of electrons is equal to the number of \_\_\_protons\_\_\_\_.
3. Sodium and potassium are examples of elements called\_\_\_alkali metals\_\_\_\_\_\_\_\_\_.
4. The number of protons and neutrons in an atom is also the \_\_\_\_\_mass\_\_\_\_\_\_ number.
5. The elements in Group 7A/17 are called the \_\_\_\_halogens\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
6. Elements that are shiny and conduct heat are called\_\_\_\_\_\_metals\_\_\_\_\_\_\_\_\_.
	* + 1. High fevers can cause convulsions in children; the doctor should be called if the child’s temperature goes over 40.0 °C. Should the doctor be called if a child has a temperature of 103 °F (8 points)?

TF = (1.8 °F/°C) TC + 32 °F

TF = (1.8 °F/°C)(40.0 °C) + 32 °F

TF = 72 °F + 32 °F

TF = 104 °F

No, the doctor does not need to be called.Or 39 °C = 103 °F

* + - 1. A lead atom has a mass of 3.4 x 10-22 g. The density of lead is 11.3 g/cm3. How many lead atoms are in a cube of lead that has a volume of 2.00 cm3 (8 points)?

$$2.00 cm^{3}×\frac{11.3 g}{1 cm^{3}}×\frac{1 atom}{3.4×10^{-22}g}=6.6×10^{22} atoms Pb$$

1. 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
	1. pizza mixture 🡪 heterogeneous
	2. isopropyl alcohol pure substance 🡪 compound
	3. salt water mixture 🡪 homogenous
2. 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.” (4 points)

The physical properties are the temperature of the land, the evaporation of water, and the humidity of the surrounding air.

1. 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 $^{2+}$
	3. an atom with mass number 27 and 14 neutrons $$
	4. an oxide ion with 9 neutrons $^{2-}$
2. Each of the orbitals depicted has the lowest value of n possible for its type. Which one has the lowest n value (3 points)?



The lowest value of n possible for an s orbital is 1. The lowest value of n possible for a p is 2. The lowest value of n possible for a d orbital is 3. The lowest value of n possible for an f is 4. Therefore, the p orbital depicted (n = 2) has a lower n value than the d orbital depicted (n = 3).

1. Answer the following questions about calcium (10 points).
	1. Write the symbol. \_\_\_\_Ca
	2. Write the complete electron configuration. \_\_\_\_\_\_\_\_\_1s2 2s22p2 3s23p6 4s2
	3. Write the shorthand electronic configuration. \_\_\_\_[Ar]4s2
	4. How many core electrons? \_\_\_18
	5. How many valence electrons? \_\_\_2
	6. When calcium loses two electrons it becomes a(n) (cation or anion)?
	7. What is the symbol of the ion? \_\_\_Ca2+
	8. Write the shorthand electron configuration for the ion. \_\_\_\_\_[Ar]
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)?

Lead has 82 protons in its nucleus while gold has 79 protons in its nucleus. Therefore, to turn lead into gold you would have to remove 3 protons from the nucleus.

1. If 1.4% of the mass of a human body is calcium, how many kilograms of calcium are there in a 125 pound woman (8 points)?

$$125 lb body×\frac{453.59 g}{1 lb}×\frac{1 kg}{1000 g}×\frac{1.4 kg Ca}{100 kg body}=0.79 kg Ca$$

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. Calculate the mass of antimony-123 (8 points).

$$121.7601 amu=\left(120.9038 amu\right)\left(\frac{57.21}{100}\right)+(m\_{Sb-123})\left(\frac{42.79}{100}\right)$$

$$121.7601 amu=6.916906398 amu+\left(0.4279\right)\left(m\_{Sb-123}\right)$$

$$52.59103602 amu=\left(0.4279\right)\left(m\_{Sb-123}\right)$$

$$122.9049685 amu=m\_{Sb-123}$$

mSb-123 = 122.9 amu this is antimony-123

1. Label each of the following pieces of laboratory glassware with their correct names: Erlenmeyer flask, graduated cylinder, hot plate, thermometer, funnel (5 points).



 Funnel thermometer hot plate graduated cylinder Erlenmeyer flask