Exam 1

Part I: Multiple Choice (2 points each)

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

Question 1. What is the answer, with the correct number of significant figures, for this problem?

4.392 g + 102.40 g + 2.51 g =

1. 109.30 g
2. 109 g
3. 110 g
4. 109.3 g
5. 109.302 g

Question 2. When ice melts, the change that takes place is

1. evaporation.
2. melting.
3. deposition.
4. a chemical change.
5. a physical change.

Question 3. Which classification is correct

1. sulfur, alkali metal
2. boron, Bo
3. iron, metal
4. fluorine, metalloid
5. all of the above

Question 4. The smallest particle of an element that retains the characteristics of the element is

1. a neutron.
2. an atom.
3. a nucleus.
4. a proton.
5. an electron.

Question 5. Ca is the symbol for \_\_\_\_\_\_\_\_.

1. carbon
2. calcium
3. cadmium
4. copper
5. cobalt

Question 6. \_\_\_\_\_\_ must be worn during lab?

1. Goggles
2. Close-toed shoes
3. Gloves
4. a & b
5. all of the above

Question 7. In case of an emergency, you should notify your instructor

1. the next day.
2. at the end of class.
3. only if the paramedics need to be called.
4. immediately.
5. not necessary.

Question 8. Tasting chemicals

1. is allowed for solutions that are very dilute.
2. is never allowed in chemistry labs.
3. is allowed for lab chemicals that we also know are “common chemicals”.
4. is allowed for chemicals that are known to be nontoxic.
5. all of the above

Question 9. How many protons are in an isotope of sodium with a mass number of 25?

1. 14
2. 15
3. 11
4. 36
5. 25

Question 10. According to Dalton’s atomic theory, which of the following are true?

1. Every element is made of atoms.
2. Atoms of an element are identical to atoms of other elements.
3. In a chemical reaction, some atoms disappear and new atoms appear.
4. all of the above
5. none of the above

Part II: 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.

Question 1. Identify each of the following as properties of a solid, liquid or gas (4 points):

* 1. The particles in a substance are very far apart. \_\_\_\_gas\_\_\_\_\_\_\_\_
	2. This substance occupies the entire volume of the container. \_\_\_gas\_\_\_\_\_\_
	3. This substance has a definite volume, \_\_\_\_\_\_liquid\_\_\_\_\_\_

 but takes the shape of its container.

* 1. The particles in the substance have very strong attractive forces. \_\_\_\_solid\_\_\_\_\_\_\_\_

Question 2. Identify the following pairings as a group, a period or neither (6 points):

* 1. Li, Na, K \_\_\_\_group\_\_\_\_\_\_\_\_
	2. Li, C, F \_\_\_\_period\_\_\_\_\_\_\_\_
	3. O, S, Se \_\_\_\_group\_\_\_\_\_\_\_\_
	4. He, H, I \_\_\_\_neither\_\_\_\_\_\_\_\_
	5. F, S, P \_\_\_\_neither\_\_\_\_\_\_\_\_

Question 3. A graduated cylinder contains 130. mL of water. A 20.0 g piece of aluminum (density = 2.70 g/cm3) is added to the graduated cylinder, what is the new level in the cylinder (8 points)?

$$V=130. mL+20.0 g Al×\frac{1 cm^{3}}{2.70 g}×\frac{1 mL}{1 cm^{3}}=130. mL+7.41 mL≈137 mL$$

Question 4. What elements are in hydroxyapatite, Ca5(PO4)OH, a major compound in human bones and teeth? Be sure to spell the name of each element correctly (4 points).

calcium, phosphorus, oxygen and hydrogen

Question 5. Classify each of the following as a homogenous mixture, heterogeneous mixture, element or compound (5 points):

* 1. Helium gas, He \_\_\_\_\_\_\_\_\_element\_\_\_\_\_\_\_\_\_
	2. Soft Drink \_\_\_\_homogeneous mixture\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. Sugar, C12H22O11 \_\_\_\_\_\_\_\_compound\_\_\_\_\_\_\_\_\_\_
	4. Cheese Sandwich \_\_\_\_\_\_\_heterogeneous mixture\_\_\_\_\_\_\_\_\_\_\_
	5. Baking Soda, NaHCO3 \_\_\_\_\_\_\_\_compound\_\_\_\_\_\_\_\_\_\_

Question 6. Write the atomic symbols for isotopes with the following characteristics. Express your answer as an isotope $$ (12 points).

1. 27 protons and 32 neutrons $$
2. a neon atom with twelve neutrons $$
3. a mass number of 24 and 13 neutrons $$
4. a titanium cation with 25 neutrons and 19 electrons $^{3+}$

Question 7. The following trace elements have been found to be crucial to the functions of the body. Indicate each as a metal, nonmetal, or semimetal (6 points).

1. Cobalt \_\_\_\_\_metal\_\_\_\_\_\_\_
2. Copper \_\_\_\_\_\_metal\_\_\_\_\_\_
3. Iodine \_\_\_\_nonmetal\_\_\_\_\_\_\_\_
4. Zinc \_\_\_\_metal\_\_\_\_\_\_\_\_
5. Selenium \_\_\_\_nonmetal\_\_\_\_\_\_\_\_
6. Manganes \_\_\_\_\_metal\_\_\_\_\_\_\_

Question 8. Carbon monoxide is a colorless, odorless gas that it toxic to humans. It combines with the metal nickel to form nickel carbonyl, a colorless liquid that boils at 43 °C (6 points).

1. List all physical properties of substances found in the preceding narrative.

 Colorless gas, odorless gas, colorless liquid, boils at 43° C

1. List all chemical properties of substances found in the preceding narrative.

Toxic to humans, Ni reacts with CO

Question 9. 18 carat white gold is an alloy of 75% gold with 25% other metals such as silver and palladium. Nickel was used as a component of white gold, however many people have reactions to it. If a necklace weighs 42 g, how many ounces of gold does it contain (8 points)? (16 oz = 1 lb)

$$42 g necklace×\frac{75 g Au}{100 g necklace}×\frac{1 lb}{453.59 g}×\frac{16 oz}{1 lb}=1.1 oz$$

Question 10. The following questions relate to temperature (8 points).

1. What is the temperature of Figure A in Celsius? 61.5 °C
2. Convert your answer above to Fahrenheit.

$$℉=\frac{9}{5}℃+32=\frac{9}{5}\left(61.5\right)+32=110.7+32=142.7 ℉≈143 ℉$$

1. Convert your answer to Kelvin.

$$K=℃+273.15=61.5+273.15=334.65 K≈334.7 K$$

Question 11. Rank the following quantities in order of decreasing distance (7 points):

50 mm, 1 Mm, 1 mm, 1 km, 100 m, 1 cm, 5 million nm,

$$50 mm=50×10^{-3}m=5×10^{-2}m=0.05 m$$

$$1Mm=1×10^{6}m=1,000,000 m$$

$$1 mm=1×10^{-3}m=0.001 m$$

$$1km=1×10^{3}m=1,000 m$$

$$100 m=1×10^{2}m$$

$$1 cm=1×10^{-2}m=0.01 m$$

$$5 million nm=5,000,000 nm=5,000,000×10^{-9}m=0.005 m$$

1. Mm > 1 km > 100 m > 50 mm > 1 cm > 5 million nm > 1 mm

Question 12. A ham sandwich contains 18 g of protein, 47 g of carbohydrate, and 4.5 g of fat. Using the table on the right, determine the number of Calories in that ham sandwich. (Remember that 1 kcal = 1 Cal) (6 points)

|  |  |
| --- | --- |
| protein | 4 kcal |
| Fat | 9 kcal |
| carbohydrate | 4 kcal |

$18 g protein×\frac{4 kcal protein}{1 g protein}+47 g carbo×\frac{4 kcal carbo}{1 g protein}+4.5 g fat×\frac{9 kcal fat}{1 g fat}=$

$$72 kcal+188 kcal+40.5 kcal=$$

$$300.5 kcal×\frac{1 Cal}{1 kcal}=301 Cal$$