

1. (10 points) Copper is a (*metal*) (*nonmetal*) (*metalloid*) _____ with a symbol of _____ and an atomic number of _____. It is in Group _____ and in period _____ of the periodic table. The element has _____ protons in the nucleus. A copper(II) ion is symbolized by _____ and has _____ electrons. Copper has two isotopes, ^{63}Cu and ^{65}Cu . Which is the more abundant? _____ The copper-63 isotope has _____ neutrons in the nucleus of an atom of the isotope.

2. (14 points) Complete the following table of names and formulas. Ions must be given with their correct electric charges.

Cation	Anion	Formula	Name
Mg^{2+}		$\text{Mg}(\text{OH})_2$	
			iron(II) chloride
Na^+			sodium acetate
			cobalt(III) oxide
Ca^{2+}	PO_4^{3-}		
Ni^{2+}		NiSO_4	

3. (3 points) Give the name or formula of each of the following *nonionic* compounds.

Name	Formula
sulfur trioxide	
	NH_3
silicon tetrachloride	

4. (2 points) Mercury has a density of 13.6 g/cm^3 . What is the mass of 125 mL of mercury?
- $1.70 \times 10^3 \text{ g}$
 - 0.109 g
 - 9.19 g
 - None of the above
5. (3 points) You want to cover a statue with a *very* thin gold foil. The statue has an area of 135 cm^2 . What mass of gold do you need if the thickness of the foil covering is 0.0100 mm? (Density of gold is 19.30 g/cm^3 .)
- 135 g
 - 261 g
 - 2.61 g
 - 1.93 g
 - None of the above

6. (6 points) Fill in the blank, circle the correct answer, or write an explanation.

- a) You have a beaker of water at 5 °C and another beaker containing an equal amount of water at 95 °C. In which beaker are the water molecules moving faster?

- b) Rank the following temperature measurements in order of increasing temperature:
72 °F, 65 °C, and 310 K

_____ *lowest T*

_____ *highest T*

- c) A flask has a volume of 250 mL. This volume in liters is _____ L
d) A popcorn kernel has a mass of 0.19 g. In milligrams, this mass is _____ mg.
e) What is the most correct answer to the calculation

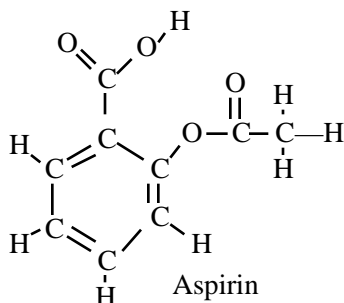
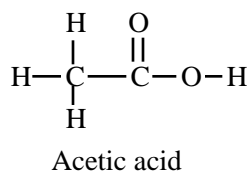
$$25 \text{ mL} \frac{13.6 \text{ g}}{1 \text{ mL}} \frac{1 \text{ mol}}{200.59 \text{ g}} = ? \text{ mol}$$

- i) 1.695 mol
ii) 1.70 mol
iii) 1.7 mol
iv) 2 mol

7. (3 points) Architectural bronze is a mixture of metals: 57% copper, 40.0% zinc, and 3.0% lead. (All percentages are mass percentages.) If you have 3.75 g of bronze, how many moles of copper does it contain?

- a) 2.1 mol
b) 0.57 mol
c) 0.034 mol
d) 0.0010 mol
e) Heaven only knows!

8. (3 points) The molecules pictured below are acetic acid (the main ingredient of vinegar) and aspirin, a commonly used analgesic. (See also the front cover of the exam.)



- a) The formula for *aspirin* is C___H___O___. (Fill in the blanks to indicate the correct number of atoms per molecule.)

- b) Both of these compounds are acids. They share a common structural feature. Circle the common structural feature in the two molecules.

9. (5 points) Observe the videodisc sequence illustrating the properties of the gases of a group in the periodic table.

- a) What do you observe in this video? What does the video illustrate? What is the relationship between the illustrated property of the gases and their position in the periodic table? What is the name of the periodic group in which these gases are found?

- b) A balloon filled with xenon gas has a volume of 1.00 L. How many atoms of xenon does the balloon contain? (The density of xenon gas at 298 K is 5.897 kg/m^3 .)