

Answer all questions in the spaces provided. Show all work on numerical problems and pay attention to significant figures. A periodic table, conversions and equations are attached.

1.(10) Identify the following as either a mixture (M), compound (C) or element (E):

a) air   M        b) paint   M        c) ammonia   C        d) nickel   E  

2.(6) In what state (solid, liquid or gas) is

a) propane at room temperature? Propane has a boiling pt. of  $-25^{\circ}\text{C}$ ; a melting pt. of  $-110^{\circ}\text{C}$ .

**Room Temperature is around  $20^{\circ}\text{C}$ . Since that is above the boiling point, it is a gas.**

b) sulfur dioxide ( $\text{SO}_2$ ) at  $-80^{\circ}\text{C}$ ?  $\text{SO}_2$  has a m.p. of  $-73^{\circ}\text{C}$ ; a b.p. of  $-10^{\circ}\text{C}$ .

**$-80^{\circ}\text{C}$  is below the melting point, therefore it is a solid.**

3.(10) Identify the following as either a physical change (P) or a chemical change (C):

a) melting gold   P        b) rusting iron   C        c) burning coal   C  

d) shattering NaCl crystals   P  

4.(16) Gallium (Ga) is in group 3A. Using the periodic table,

a) What is the atomic mass of gallium? **69.72 amu**

b) What does one atom of Ga weigh in grams?  $1 \text{ amu} = 1.661 \times 10^{-24} \text{ g}$

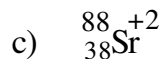
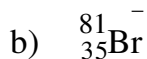
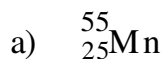
**$1 \text{ atom weighs } 69.72 \text{ amu} \times 1.661 \times 10^{-24} \text{ g} / 1 \text{ amu} = 1.158 \times 10^{-22} \text{ g}$**

c) what is this mass in mg?

**$1.158 \times 10^{-22} \text{ g} \times 10^3 \text{ mg} / 1 \text{ g} = 1.158 \times 10^{-19} \text{ mg}$**

5.(15) In the following, determine the number of protons, neutrons and electrons in one atom or ion.

Note, b) is an anion and c) is a cation



$p^{+}$  **25**

**35**

**38**

$n^{\circ}$  **30**

**46**

**50**

$e^{-}$  **25**

**36**

**36**

one extra  $e^{-}$  in anion

2 fewer  $e^{-}$ s in +2 cation

6.(10) A hospital bed is 2122 mm long.

a) What is the length in centimeters?

$$2122 \text{ mm} \times 1 \text{ cm} / 10 \text{ mm} = \mathbf{212.2 \text{ cm}}$$

b) What is the length in ft? 1 inch = 2.54 cm; 1 foot = 12 inches

$$212.2 \text{ cm} \times 1 \text{ inch} / 2.54 \text{ cm} \times 1 \text{ ft} / 12 \text{ in} = \mathbf{6.96 \text{ ft}}$$

7.(12) Give the formula for the following binary ionic compounds.

a) potassium iodide  
**KI**

b) lithium oxide  
**Li<sub>2</sub>O**

c) magnesium sulfide  
**MgS**

8.(12) Give the name of the ionic compounds in a) and b); give the formula for c):

a) Na<sub>2</sub>CO<sub>3</sub>  
**sodium carbonate**

b) Ca<sub>3</sub>(PO<sub>4</sub>)<sub>3</sub>  
**calcium phosphate**

c) ammonium sulfate  
**(NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>**

9.(15) Name the following compounds using the Roman numeral following the metal to denote charge.

a) FeBr<sub>3</sub>  
**iron (III) bromide**

b) SnF<sub>2</sub>  
**Tin (II) fluoride**

c) Cu<sub>2</sub>SO<sub>3</sub>  
**Copper (I) sulfite**

d) V<sub>2</sub>O<sub>5</sub>  
(V is vanadium)  
**Vanadium (V) oxide**

10.(10) The diameter of a red blood cell is  $6.0 \times 10^{-6}$  m, which is 600 times larger in diameter than an influenza virus. What is the diameter of an influenza virus in meters? In mm? Keep your answers in scientific notation with 2 significant figures.

$$\begin{aligned} \text{Flu virus is } 1/600 \text{ the size of the RBC. } & 6.0 \times 10^{-6} \text{ m} \times 1/600 = \mathbf{1.0 \times 10^{-8} \text{ m}} \\ & 1.0 \times 10^{-8} \text{ m} \times 10^3 \text{ mm} / 1 \text{ m} = \mathbf{1.0 \times 10^{-5} \text{ mm}} \end{aligned}$$

11.(12) Give the electron configuration for the following elements or ions (1s<sup>2</sup>...):

a) fluoride anion **F<sup>-</sup>**  
**10 e<sup>-</sup> 1s<sup>2</sup>2s<sup>2</sup>sp<sup>6</sup>**

b) aluminum(III) cation **Al<sup>+3</sup>**  
**10 e<sup>-</sup> 1s<sup>2</sup>2s<sup>2</sup>sp<sup>6</sup>**

c) K atom **19 e<sup>-</sup>**  
**1s<sup>2</sup>2s<sup>2</sup>2p<sup>6</sup>3s<sup>2</sup>3p<sup>6</sup>4s<sup>1</sup>**

12.(12) Using the periodic table, give the electron dot symbol (number of valence electrons) for:

a) **· $\ddot{\text{Se}}$ ·**

b) **· $\ddot{\text{As}}$ ·**

c) **· $\dot{\text{Ca}}$ ·**

d) **Cs·**

13.(10) Differentiate between **mass number** and **atomic mass** for an element (define each). Why don't you see the mass number of an element on the periodic table?

The **mass number** is the sum of the protons + neutrons in the nucleus of an atom.

The **atomic mass** is the weighted average of all the masses of the isotopes of a given element.

The **mass number is not on the periodic table** because many (most) elements have several mass numbers (isotopes).

14.(12) Using the periodic table, identify the element symbol that has the following number of valence electrons in the subshell given. **Also**, identify each as a metal or a nonmetal.

a) 4 electrons in its 3p subshell **S nonmetal**

b) 1 electron in its 5s subshell **Rb metal**

c) has 6 electrons in its 3d subshell **Fe metal**