

A few constants

$$N_a = 6.022 \times 10^{23} \text{ mol}^{-1}$$

$$\text{for H}_2\text{O } d = 1.00 \text{ g/cm}^3$$

$$\text{for CCl}_4 \text{ } d = 1.594 \text{ g/cm}^3$$

$$\text{for I}_2 \text{ } d = 4.930 \text{ g/cm}^3$$

$$\text{atomic mass } {}^6\text{Li} = 6.0151223 \text{ amu}$$

$$\text{Natural abundance } {}^6\text{Li} = 7.50\%$$

$$\text{atomic mass } {}^7\text{Li} = 7.0160041 \text{ amu}$$

$$\text{natural abundance } {}^7\text{Li} = 92.50\%$$

$$\text{atomic mass } {}^{12}\text{C} = 12.0000$$

$$\text{natural abundance } {}^{12}\text{C} = 98.89\%$$

$$\text{atomic mass } {}^{13}\text{C} = 13.00335$$

$$\text{natural abundance } {}^{13}\text{C} = 1.11\%$$

1. (2 pts. each) Provide formulas for the following compounds.

a. carbonic acid

b. barium nitrate

c. manganese(II) iodide

d. sulfur dioxide

e. mercury(I) chloride

2. (3 pts. each) Label the following as ionic compound, covalent molecule, or acid, and provide names for the following compounds.

a. CuSO_4

b. KSCN

c. N_2O

d. H_3PO_4

e. RuCl_3

3. (10 pts.) Determine the average atomic mass (in amu) of a Li atom.

4. a. (5 pts.) There are only two stable isotopes of Cl, ${}^{35}\text{Cl}$ and ${}^{37}\text{Cl}$. The average atomic mass of a chlorine atom is 35.453 amu. Which isotope is more abundant, ${}^{35}\text{Cl}$ or ${}^{37}\text{Cl}$?

b. (5 pts.) There are only two stable isotopes of Cu, ${}^{63}\text{Cu}$ and ${}^{65}\text{Cu}$. The average atomic mass of a copper atom is 63.55 amu. Which isotope is more abundant, ${}^{63}\text{Cu}$ or ${}^{65}\text{Cu}$?

5. (10 pts.) Determine the number of moles of H_2O in 35.8 kg of H_2O .

6. (10 pts.) Determine the number of moles of I_2 in 19.2 cm^3 of I_2 .

7. (6 pts) Using the periodic table and the fact that fluorine has only one stable isotope, determine the number of protons, neutrons, and electrons in a fluoride ion.

8. (1 pt. ea.) Mark the following statements true or false

a. _____ Electrons and protons are evenly distributed throughout an atom.

b. _____ Atoms can be seen with an electron microscope.

c. _____ The mass of a neutron is almost the same as the mass of a proton.

d. _____ In a neutral atom, the number of neutrons present always equals the number of protons present.

e. _____ All of the isotopes of a given element have the same atomic number.

f. _____ All of the isotopes of a given element have the same number of protons.

g. _____ All of the isotopes of a given element have the same mass number.

h. _____ $^{10}_6\text{C}$ is the symbol for carbon-10, which is an isotope of carbon that has 6 protons and 10 neutrons.

i. _____ In a binary molecule (NO_2 for example), the ratio of the mass of one element to the mass of the other element is always a small whole number ratio.

9. (10 pts.) A student has a 3.552 g sample of Li_2O and wants to know how much lithium is in the sample. Determine the mass of the lithium in the sample of lithium oxide.

10. (10 pts.) Determine the number of chlorine atoms in 3.98 g of CCl_4 .