

WS 7.0 Part I. Intro to Moles!

1. Fill in the blanks:
- 1 "pair" = _____ socks, etc.
 - 1 "dozen" = _____ eggs, golf balls, etc.
 - 1 "gross" = _____ things
 - 1 "mole" = 6.02×10^{23} atoms, molecules, etc.

The number, 6.02×10^{23} , is also known as "**Avogadro's Number**" after the Italian scientist, Amadeo Avogadro. It is sometimes abbreviated as N_A . MEMORIZE THIS NUMBER!!!

2a. If you have 2.0 dozen water molecules, how many water molecules is this? _____

2b. If you have 30. eggs, how many dozen eggs is this? _____

3a. If you have 2.00 moles of water molecules, how many water molecules is this?

b. If you have 1.505×10^{24} water molecules, how many moles of water is this?

4. How many helium atoms are in 4.6 moles of helium?

5. If you have 1.8×10^{21} carbon tetrachloride molecules, how many moles of carbon tetrachloride is this?

6. How many oxygen (O_2) molecules are in 0.00100 moles of oxygen?

7. How many moles of carbon dioxide correspond to 6.5×10^{24} molecules?

8. If you have 5.00 moles of water, how many water molecules is this?

9. Determine the number of atoms in each of these molecules.

H_2O _____ F_2 _____ SF_6 _____ $C_6H_{12}O_6$ _____ CF_4 _____ P_4O_{10} _____

H_2SO_4 _____ $C_{254}H_{377}N_{65}O_{75}S_6$ _____ I_2 _____ CO_2 _____
(sulfuric acid) (cow insulin; a protein hormone)

C_8H_{18} _____ C_2H_5OH _____ $C_4H_{10}FO_2P$ _____ $C_{57}H_{110}O_6$ _____
(octane, found in gasoline) (ethanol) ("sarin," a very toxic nerve agent.) (tristearin; the main fat found in beef tallow.)

WS 7.0 Part II. Molar masses!

1a. The average mass of an iron atom is 9.277×10^{-23} grams (this was discovered by experiments culminating in 1909). What is the mass of 6.02×10^{23} iron atoms; in other words, what is the mass of 1 mole of iron atoms?

b. Iron's atomic mass can be written as _____ or _____

2a. The average mass of a lithium atom is 1.153×10^{-23} g.
What is the mass of 6.02×10^{23} lithium atoms; in other words, what is the mass of 1 mole of lithium atoms?

b. Lithium's atomic mass can be written as _____ or _____.

3a. How many copper atoms are in 1.00 mole of copper? _____

b. How many water molecules are in 1.00 mole of water? _____

c. What is the atomic mass (or "molar mass") of Copper (Cu)? _____

d. What is the atomic mass (or "molar mass") of Gold (Au)? _____

e. What is the molar mass of nitrogen (N_2)? _____

4a. Calculate the molar mass of water.

b. Calculate the molar mass of Iron (II) nitrate: $Fe(NO_3)_2$.

c. Calculate the molar mass of oxygen (Hint: remember HOFBrINCl!).

d. Calculate the molar mass of aluminum thiosulfate; $Al_2(S_2O_3)_3$.

e. Calculate the molar mass of ammonium carbonate; $(NH_4)_2CO_3$