WS 7.1 Moles! Key Name:_____ p._____

Part I. Intro to Avogadro's Number

1. Fill in the blanks:

1 "pair" = 2 socks, etc.
1 "dozen" = 12 eggs, golf balls, etc.
1 "gross" = 144 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?

$$(2.0 \text{ dozen})\left(\frac{12 \text{ molecules}}{1 \text{ dozen}}\right) = 24 \text{ molecules}$$

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

$$(2.00 \text{ moles})\left(\frac{6.02\times10^{23} \text{ molecules}}{1 \text{ mole}}\right) = 1.204\times10^{24} \rightarrow 1.20\times10^{24} \text{ molecules}$$

3a. If you have 30. eggs, how many dozen eggs is this?

$$(30. \text{ eggs})\left(\frac{1 \text{ dozen}}{12 \text{ eggs}}\right) = 2.5 \text{ dozen}$$

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

$$(1.505\times10^{24} \text{ molecules})\left(\frac{1 \text{ mole}}{6.02\times10^{23} \text{ molecules}}\right) = 2.50 \text{ moles}$$

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

$$(4.6 \text{ moles})\left(\frac{6.02\times10^{23} \text{ atoms}}{1 \text{ mole}}\right) = 2.7692\times10^{24} \rightarrow 2.8\times10^{24} \text{ atoms}$$

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

$$(1.8\times10^{21} \text{ molecules})\left(\frac{1 \text{ mole}}{6.02\times10^{23} \text{ molecules}}\right) = .00299 \rightarrow .0030 \text{ moles}$$

6a. How many oxygen (O_2) molecules are in 0.0010 moles of oxygen?

$$(.0010 \text{ moles})\left(\frac{6.02\times10^{23} \text{ molecules}}{1 \text{ mole}}\right) = 6.02\times10^{20} \rightarrow 6.0\times10^{20} \ O_2 \text{ molecules}$$

b. How many <u>atoms</u> are in the 0.0010 mole sample of oxygen, from part (a)?
(Hint: how many atoms are in each O_2 molecule?)

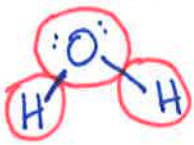
$$(6.02\times10^{20} \text{ molecules}_{O_2})\left(\frac{2 \text{ atoms}}{1 \text{ molecule}}\right) = 1.204\times10^{21} \rightarrow 1.2\times10^{21} \text{ atoms}$$

7a. If you have 5.00 moles of water, how many water molecules is this?

$$(5.00 \text{ moles})\left(\frac{6.02\times10^{23} \text{ molecules}}{1 \text{ mole}}\right) = 3.01\times10^{24} \text{ molecules } H_2O$$

b. How many atoms are in those 5.00 moles of water?
(Hint, how many atoms are in each molecule of H_2O?)

$$(3.01\times10^{24} \text{ molecules})\left(\frac{3 \text{ atoms}}{1 \text{ molecule}}\right) = 9.03\times10^{24} \text{ atoms}$$



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

$$(6.5\times10^{24} \text{ molecules})\left(\frac{1 \text{ mole}}{6.02\times10^{23} \text{ molecules}}\right) = 10.797 \rightarrow 11 \text{ moles } CO_2$$