Name _____ Period _____ Date _____

Grams and Particles Conversion Worksheet

There are three definitions (equalities) of the mole. The second one that we will explore is:

1 mole = 6.022×10^{23} particles ←*particles* could mean atoms, ions, molecules, or formula units

Each definition can be written as a set of two conversion factors. For this second definition they are:

1 mole = Avogadro's number can be written as: $\left(\frac{1 \text{ mole}}{6.022 \times 10^{23} \text{ particles}}\right)$ ***OR*** $\left(\frac{6.022 \times 10^{23} \text{ particles}}{1 \text{ mole}}\right)$

How do you choose which conversion factor to use? *Look at what you were given in the problem.*

- *If you are given particles, then you would choose the conversion factor on the left so that "particles" will cancel out.*
- *If your are given moles and want to go to particles, then use the conversion factor on the right so that the "moles" can cancel out and not be in your final answer.*

The Steps to Solving Mole Problems:

1. **Write down the value(s) that you are given in a problem.**
2. **Choose a conversion factor that has the unit that you want to get rid of on the bottom and the unit that you want in your answer on the top.**
3. **Cancel out the units from the top left and bottom right, and then find the answer by multiplying all the stuff on the top together and dividing it by the stuff on the bottom.**

Solve **any 12** of the following:

1) How many molecules are there in 24 grams of FeF_3? **(molar mass of FeF_3 is 113 g/ mole)**

24 grams x $\frac{1 \text{ mole}}{113 \text{ grams}}$ x $\frac{6.022 \times 10^{23} \text{ molecules}}{1 \text{ mole}}$ = 1.28×10^{23} molecules

2) How many molecules are there in 450 grams of Na_2SO_4?

3) How many grams are there in 2.3×10^{24} atoms of silver? **(molar mass of Ag is 108g/mole)**

2.3×10^{24} atoms x $\frac{1 \text{ mole}}{6.022 \times 10^{23} \text{ atoms}}$ x $\frac{108 \text{ grams}}{1 \text{ mole}}$ = 421 grams of silver

4) How many grams are there in 7.4×10^{23} molecules of $AgNO_3$?

5) How many grams are there in 7.5×10^{23} molecules of H_2SO_4?

6) How many molecules are there in 122 grams of $Cu(NO_3)_2$?

7) How many grams are there in 9.4×10^{25} molecules of H_2?

8) How many molecules are there in 230 grams of $CoCl_2$?

9) How many molecules are there in 2.3 grams of NH_4SO_2?

10) How many grams are there in 3.3×10^{23} molecules of N_2I_6?

11) How many molecules are there in 200 grams of CCl_4?

12) How many grams are there in 1×10^{24} molecules of BCl_3?

13) How many grams are there in 4.5×10^{22} molecules of $Ba(NO_2)_2$?