2 –Step Mole Conversions – ANSWERS

**Remember: Convert to moles first!

1) How many molecules are there in 47 grams of FeF_3?

$M_{FeF_3} = \underset{1(55.845)}{Fe} + \underset{3(18.998)}{F}$
$= 112.839\ g/mol$

$n = \frac{m}{M}$
$= \frac{47g}{112.839\ g/mol}$
$\doteq 0.417\ mol$

$N = nN_A$
$= (0.417\ mol)(6.02 \times 10^{23})$
$\doteq 2.51 \times 10^{23}$ molecules

2) How many molecules are there in 375 grams of Na_2SO_4?

$M_{Na_2SO_4} = \underset{2(22.990)}{Na} + \underset{1(32.065)}{S} + \underset{4(15.999)}{O}$
$= 142.041\ g/mol$

$n = \frac{m}{M}$
$= \frac{375g}{142.041\ g/mol}$
$= 2.640\ mol$

$N = nN_A$
$= (2.640\ mol)(6.02 \times 10^{23})$
$\doteq 1.589 \times 10^{24}$ molecules

3) How many grams are there in 2.3×10^{23} atoms of silver?

$n = \frac{N}{N_A}$
$= \frac{2.3 \times 10^{23}}{6.02 \times 10^{23}}$
$\doteq 0.382\ mol$

$m = nM$
$= (0.382\ mol)(107.87\ g/mol)$
$\doteq 41.21\ g$

4) How many grams are there in 19.2×10^{23} molecules of $AgNO_3$?

$M_{AgNO_3} = \underset{1(107.87)}{Ag} + \underset{1(14.007)}{N} + \underset{3(15.999)}{O}$
$= 169.874\ g/mol$

$n = \frac{N}{N_A}$
$= \frac{19.2 \times 10^{23}}{6.02 \times 10^{23}}$
$\doteq 3.189\ mol$

$m = nM$
$= (3.189\ mol)(169.874\ g/mol)$
$\doteq 541.79\ g$

5) How many molecules are there in 968 grams of H_2SO_4?

$M_{H_2SO_4} = \underset{2(1.0079)}{H} + \underset{1(32.065)}{S} + \underset{4(15.999)}{O}$
$\doteq 98.077\ g/mol$

$n = \frac{m}{M}$
$= \frac{968g}{98.077\ g/mol}$
$\doteq 9.870\ mol$

$N = nN_A$
$= (9.870\ mol)(6.02 \times 10^{23})$
$= 5.942 \times 10^{24}$ molecules

6) How many molecules are there in 100 moles of $Cu(NO_3)_2$?

$M_{Cu(NO_3)_2} = \underset{1(63.546)}{Cu} + \underset{2(14.007)}{N} + \underset{6(15.999)}{O}$
$= 187.554\ g/mol$

$N = nN_A$
$= (100)(6.02 \times 10^{23})$
$= 6.02 \times 10^{25}$ molecules

~~7) How many atoms are there in 27×10^{23} molecules of Calcium (Ca)?~~

8) Convert the following two-step quantities, converting first to moles and then to the desired quantity.

a. Find the number of molecules in 60.0 g of N_2O.
b. Find the volume of 3.24×10^{22} molecules of Ne
c. Find the mass of 18.0 L of CH_4
d. Find the volume of 835 g of SO_3
e. Find the mass of one atom of nickel.