Mole Money, Mole Problems

Name Key

Block ___ Date _____

Perform the following conversions. Show all of your work, mind sig figs, and include your units to receive full credit.

1) Determine how many moles of aluminum nitrate ($Al(NO_3)_3$) are in 17.5g.

$$17.5\ g \left(\frac{1\ mol}{212.996\ g}\right) = \boxed{0.0822\ mol\ Al(NO_3)_3}$$

2) How many molecules of chlorine gas (Cl_2) are in 0.354 mol?

$$0.354\ mol \left(\frac{6.02 \times 10^{23}\ molecules}{1\ mol}\right) = \boxed{2.13 \times 10^{23}\ molecules}$$

3) How many moles of calcium sulfate ($CaSO_4$) do 1.22×10^{24} molecules represent?

$$1.22 \times 10^{24}\ molecules \left(\frac{1\ mol}{6.02 \times 10^{23}\ molecules}\right) = \boxed{2.03\ mol}$$

4) How many grams does 2.23 mol of ammonium phosphate ($(NH_4)_3PO_4$) weigh?

$$2.23\ mol \left(\frac{149.09\ g}{1\ mol}\right) = \boxed{332\ g}$$

5) How many grams does 1.45×10^{23} molecules of water (H_2O) weigh?

$$1.45 \times 10^{23} \text{ molecules} \left(\frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}}\right)\left(\frac{18.02 \text{ g}}{1 \text{ mol}}\right) = \boxed{4.34 \text{ g}}$$

6) How many molecules of iron (II) bromide ($FeBr_2$) are present in a 3.29g sample?

$$3.29 \text{ g} \left(\frac{1 \text{ mol}}{215.65 \text{ g}}\right)\left(\frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}}\right) = \boxed{9.18 \times 10^{21} \text{ molecules}}$$

7) How many acetate ions are present in 14.3 g of cobalt (III) acetate? ($Co(C_2H_3O_2)_3$)

$$14.3 \text{ g} \left(\frac{1 \text{ mol}}{236.06 \text{ g}}\right)\left(\frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}}\right)\left(\frac{3 \text{ acetate}}{1 \text{ molecule}}\right) = \boxed{1.09 \times 10^{23} \text{ acetate ions}}$$

8) If 8.03×10^{24} oxygen atoms are present in a sample of sodium carbonate (Na_2CO_3), how much does the sample weigh in grams?

$$8.03 \times 10^{24} \text{ oxygen atoms} \left(\frac{1 \text{ molecule}}{3 \text{ oxygen}}\right)\left(\frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ molecules}}\right)\left(\frac{105.97 \text{ g}}{1 \text{ mol}}\right) = \boxed{471 \text{ g}}$$