Chemistry 112

Learning Opportunities

May 11 – 15

Mole ratios

When you have a balanced chemical equation, the coefficients represent the ratio of the molecules that are part of the chemical reaction. This can be used when you have information about the amount of one substance in the reaction and you want to calculate how much of another substance is involved in the reaction.

$$2NaCl_{(aq)} + H_2SO_{4(aq)} \rightarrow Na_2SO_{4(aq)} + 2HCl_{(aq)}$$

The above equation means:

Two moles of sodium chloride react with one mole of sulfuric acid to produce one mole of sodium sulfate and two moles of hydrochloric acid. (numbers and formulas are so much more compact)

See Mole ratios – Sample problems

Practice problems

1. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

How many moles of H_2O are produced when 5.86 moles of CH_4 react?

2. $CaC_2 + 2H_2O \rightarrow C_2H_2 + Ca(OH)_2$

How many moles of CaC_2 are needed to produce 5.06 mol of C_2H_2?

3. $2KClO_3 \rightarrow 2KCl + 3O_2$

How many moles of O_2 are produced when 8.55 mol of $KClO_3$ reacts?

4. $3NO_2 + H_2O \rightarrow 2HNO_3 + NO$

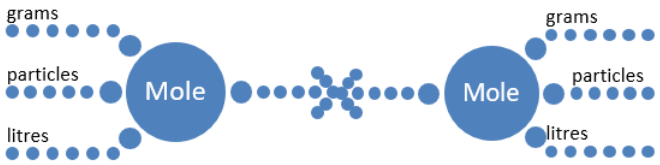
How many moles of NO_2 are needed to react with 8.64 mol of H_2O?

5. $2CO + O_2 \rightarrow 2CO_2$

Write 6 molar ratios for this chemical reaction.

Thee step calculations

Combining the conversions you have already learned with molar ratios allows you to do many different calculations. You can now go from any point to any other point on the diagram below:



Make sure you ***always go to moles before changing from one substance to another ***

See Three step conversions – Sample problems

Practice problems

1. $CaC_2 + 2H_2O \rightarrow C_2H_2 + Ca(OH)_2$

How many grams of C_2H_2 are produced when 5.00 g of CaC_2 react?

2. $2KClO_3 \rightarrow 2KCl + 3O_2$

How many molecules of O_2 are produced when 6.54 g of $KClO_3$ react?

3. $3NO_{2(g)} + H_2O \rightarrow 2HNO_3 + NO_{(g)}$

How many liters of $NO_{2(g)}$ at STP are needed to produce 5.00 X 10^{22} molecules of NO?

4. $2\ C_8H_{18(g)} + 25\ O_{2(g)} \rightarrow 16\ CO_{2(g)} + 18\ H_2O_{(g)}$

How many liters of $H_2O_{(g)}$ are formed when 0.86L of $O_{2(g)}$ reacts at STP?