AP CHEMISTRY

TOPIC 2: STOICHIOMETRY, PART A **EXAMPLES** Day 13:

- Stoichiometry (Basics)

---

1) How many moles of magnesium are necessary to react completely with 50.5 moles of oxygen gas to form magnesium oxide?

1) BALANCE EQUATION
2) CONVERT TO MOLES
3) USE MOLE RATIO
4) CONVERT TO DESIRED UNITS

$\underline{2}\,Mg + O_2 \rightarrow \underline{2}\,MgO$ (1) ✓

$$\frac{50.5\ mol\ O_2 \mid 2\ mol\ Mg}{1\ mol\ O_2} = 101\ mol\ Mg$$

(2) ✓ (3) ✓ 4 ✓

2) Calculate the number of moles of the only precipitate, calcium sulfate, that will be formed in the double replacement reaction when excess calcium nitrate reacts with 125 grams of sodium sulfate. Sodium nitrate is also formed in the reaction.

$$Ca(NO_3)_2 + Na_2SO_4 \rightarrow CaSO_{4(s)} + \underline{2}\,NaNO_3$$

$$\frac{125g\ Na_2SO_4 \mid 1\ mol\ Na_2SO_4 \mid 1\ mol\ CaSO_4}{\mid 2(22.99g) + 32.06g + 4(16g) \mid 1\ mol\ Na_2SO_4} = 0.880\ mol\ CaSO_4$$

3) Calculate the mass (in grams) of gold(III) nitrate will be needed to react with excess solid calcium hydroxide to produce 4.75 kilograms of the only precipitate, gold(III) hydroxide? Calcium nitrate is also produced.

$$\underline{2}\,Au(NO_3)_3 + \underline{3}\,Ca(OH)_2 \rightarrow \underline{2}\,Au(OH)_3 + \underline{3}\,Ca(NO_3)_2$$

$$\frac{4.75\ kg\ Au(OH)_3 \mid 10^3\ g \mid 1\ mol\ Au(OH)_3 \mid 2\ mol\ Au(NO_3)_3 \mid 383\ g}{\mid 1\ kg \mid 196.97g + 3(16g) + 3(1.008g \mid 2\ mol\ Au(OH)_3 \mid 1\ mol\ Au(NO_3)_3}$$

$$= 7.34 \times 10^3\ g\ Au(NO_3)_3$$