

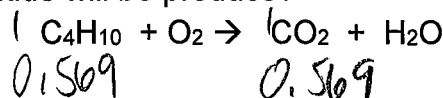
KEY

Name: _____

Stoichiometry Calculations Review

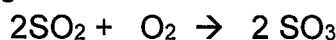
Directions: Solve for the following problems. Show all work!

1. If you had .569 moles of butane (C₄H₁₀) reacting with excess oxygen, how many grams of carbon dioxide will be produced?



$$\boxed{0.569 \text{ moles of CO}_2}$$

2. How many moles of oxygen gas needed to combine with 3.1 moles of SO₂?



$$3.1 \text{ moles } \times$$

$$\frac{2 \text{ SO}_2}{1 \text{ O}_2} = \frac{3.1 \text{ SO}_2}{x \text{ O}_2}$$

$$\frac{3.1}{2} = \frac{2x}{2}$$

$$\boxed{x = 1.55 \text{ moles O}_2}$$

3. Calculate the gram formula mass of Al₂(SO₄)₃

$$\boxed{342 \text{ g/mol}}$$

$$\text{Al} = 27(2) = 54$$

$$\text{S} = 32(3) = 96$$

$$\text{O} = 16(12) = 192$$

$$\underline{\hspace{1cm}} \\ 342 \text{ g/mol}$$

4. Calculate the number of moles in 25.00 g LiCl.

$$25.00 \text{ g} \times \frac{1 \text{ mol}}{42.5 \text{ g}} = \boxed{0.59 \text{ moles}}$$

$$\text{Li} = 7$$

$$\text{Cl} = \frac{35.5}{42.5 \text{ g/mol}}$$

5. Calculate the mass (in grams) of 3.00 moles Ca.

$$3.00 \text{ moles} \times \frac{40 \text{ g}}{1 \text{ mol}} = \boxed{120 \text{ g}}$$

6. Determine the mass (in grams) of each of 1.25 mol Ca₃(PO₄)₂

$$1.25 \text{ moles} \times \frac{310 \text{ g}}{1 \text{ mol}} = \boxed{387.5 \text{ g}}$$

$$\text{Ca} = (3)(40) = 120$$

$$\text{P} = (2)(31) = 62$$

$$\text{O} = (8)(16) = 128$$

$$\underline{\hspace{1cm}} \\ 310 \text{ g/mol}$$

7. Calculate the percent composition for Mg and Cl in MgCl₂

$$\text{Mg} = 24.3$$

$$\text{Cl} = (2)(35.5) = 71$$

$$\underline{\hspace{1cm}} \\ 95.3 \text{ g/mol}$$

$$\text{Mg} = \frac{24.3}{95.3} \times 100 = \boxed{25.5\%}$$

$$\text{Cl} = \frac{71}{95.3} \times 100 = \boxed{74.5\%}$$

8. Find the percent composition of Carbon in $C_6H_{12}O_6$

$$C = (6)(12) = 72$$

$$H = (12)(1) = 12$$

$$O = (6)(16) = 96$$

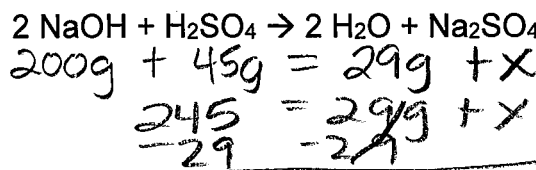
~~180 g/mol~~

$$C = \frac{72}{180} \times 100 = 40.0\%$$

$$H = \frac{12}{180} \times 100 = 6.7\%$$

$$O = \frac{96}{180} \times 100 = 53.3\%$$

9. How many grams of sodium sulfate will be formed if you start with 200 grams of sodium hydroxide, 45 grams of sulfuric acid and produce 29 grams of water?



$$X = 216 \text{g Na}_2\text{SO}_4$$

10. Determine the molecular formula for a compound with an empirical formula NO_2 and a molar mass of 92.02 g/mol.

$$\text{NO}_2 \times 2 = \boxed{\text{N}_2\text{O}_4}$$

$$N = 14$$

$$O = 2(16) = 32$$

$$\frac{46 \text{ g/mol}}$$

$$\frac{92.02 \text{ g/mol}}{46 \text{ g/mol}} = 2$$

11. Convert -45°C to Kelvin.

$$K = ^\circ\text{C} + 273$$

$$K = -45 + 273$$

$$\boxed{K = 228 \text{ K}}$$

12. Convert 657K to $^\circ\text{C}$.

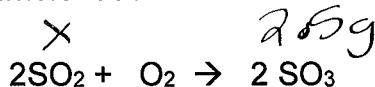
$$K = ^\circ\text{C} + 273$$

$$657 = x + 273$$

$$\underline{-273} \quad \underline{-273}$$

$$\boxed{^\circ\text{C} = 384}$$

13. BONUS: Using the equation below, calculate the mass of SO_2 needed to produce 2.5g of SO_3 if excess oxygen is available. *Hint, you must do a mole conversion first, then a mole:mole ratio calculation and then convert mass back to moles!



① $2.5\text{g} \times \frac{1\text{mol}}{80\text{g}} = 0.03125 \text{ moles}$

$$\text{SO}_3 = S = 32$$

$$O = (16)(3) = 48$$

$$\underline{+}$$

$$80 \text{ g/mol}$$

② $0.03125 \times 2 = 0.03125$

$$\text{SO}_2 = \text{SO}_2$$

③ $0.03125 \text{ moles} \times \frac{64 \text{ g}}{1 \text{ mol}} = \boxed{2 \text{g SO}_2}$