Chemistry CP
Stoichiometry Quiz #1

Name: Key

1. What does a balanced equation tell you that an unbalanced equation does not? (2 points)

A balanced equation tells you relative moles (mole ratios) of reactants and products.

2. Using this balanced equation: $2Na + 2\ H_2O \rightarrow 2NaOH + H_2$, complete the following Mole Ratios: (3 Points)

2 moles of Na = 2 moles of H_2O

2 moles of Na = 1 moles of H_2

2 moles of Na = 2 moles of NaOH

2 moles of H_2O = 2 moles of NaOH

2 moles of H_2O = 1 moles of H_2

2 moles of NaOH = 1 moles of H_2

3. According to the following balanced equation, $2\ Fe + 3Cl_2 \rightarrow 2FeCl_3$, how many **moles** of Chlorine (molar mass = 70.906 g/mol) will be needed to produce 10.9 **moles** of Iron (III) Chloride ($FeCl_3$, molar mass = 162.204 g/mol)? (3 Points)

$$10.9\ \text{moles}\ FeCl_3 \left| \frac{3\ \text{mol}\ Cl_2}{2\ \text{mol}\ FeCl_3} \right. = 16.35\ \text{moles}\ Cl_2$$

4. According to the following balanced equation, $2\ Fe + 3Cl_2 \rightarrow 2FeCl_3$, how many **moles** of iron (atomic mass = 55.845 g/mol) will be needed to produce 1.89 **moles** of Iron (III) Chloride ($FeCl_3$, molar mass = 162.204 g/mol)? (3 Points)

$$1.89\ \text{mole}\ FeCl_3 \left| \frac{2\ \text{moles}\ Fe}{2\ \text{moles}\ FeCl_3} \right. = 1.89\ \text{moles}\ Fe$$

5. Using this balanced equation, $2\ Mg + O_2 \rightarrow 2MgO$ how many **grams** of magnesium (Mg atomic mass = 24.305 g/mol) will be used if 2.14 **moles** of magnesium oxide (MgO, molar mass = 40.304 g/mol) are reacted? (5 Points)

$$2.14\ \text{moles}\ MgO \left| \frac{2\ \text{moles}\ Mg}{2\ \text{moles}\ MgO} \right. = 2.14\ \text{moles}\ Mg$$

$$2.14\ \text{moles}\ Mg \left| \frac{24.305\ g}{1\ \text{mole}} \right. = 52.0127\ g\ Mg$$

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6. Using this balanced equation, 2 Mg + O_2 → 2MgO how many **grams** of oxygen (O_2 molar mass = 31.998 g/mol) will be used if 3.62 **moles** of magnesium oxide (MgO, molar mass = 40.304 g/mol) are reacted? (5 Points)

$$3.62 \text{ moles MgO} \left| \frac{1 \text{ mole } O_2}{2 \text{ moles MgO}} \right. = 1.81 \text{ moles } O_2$$

$$1.81 \text{ moles } O_2 \left| \frac{31.998 \text{ g}}{1 \text{ mole } O_2} \right. = 57.91638 \text{ g } O_2$$

7. Using this balanced equation, $2BCl_3 + 3H_2 \rightarrow 2B + 6HCl$, how many **grams** of hydrochloric acid (HCl, Molar mass = 36.4609 g/mol) can be produced from 4.65 **grams** of Hydrogen gas (molar mass=~~1~~2.0158 g/mol)? (7 Points)

Typo!

$$4.65 \text{ g } H_2 \left| \frac{1 \text{ mol}}{2.0158 \text{ g}} \right. = 2.3068 \text{ mol } H_2$$

$$2.3068 \text{ mol } H_2 \left| \frac{6 \text{ mol HCl}}{3 \text{ mol } H_2} \right. = 4.6135 \text{ mol HCl}$$

$$4.6135 \text{ mol HCl} \left| \frac{36.4609 \text{ g}}{1 \text{ mol HCl}} \right. = 168.21 \text{ g HCl}$$

8. Using this balanced equation, $2BCl_3 + 3H_2 \rightarrow 2B + 6HCl$, how many **grams** of hydrochloric acid (HCl, Molar mass = 36.4609 g/mol) can be produced from 17.6 **grams** of boron trichloride (molar mass= 117.17 g/mol)? (7 Points)

$$17.6 \text{ g } BCl_3 \left| \frac{1 \text{ mol}}{117.17 \text{ g } BCl_3} \right. = .15021 \text{ mol } BCl_3$$

$$.15021 \text{ mol } BCl_3 \left| \frac{6 \text{ mol HCl}}{2 \text{ mol } BCl_3} \right. = .45063 \text{ mol HCl}$$

$$.45063 \text{ mol HCl} \left| \frac{36.4609 \text{ g}}{1 \text{ mol HCl}} \right. = 16.43 \text{ g HCl}$$