Stoichiometry Extra Practice   Key

1. Predict the products of the following reaction, then balance the reaction.
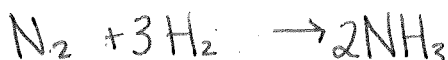
$$3 \text{ Ca} + \text{Al}_2(\text{SO}_3)_3 \rightarrow 2\text{Al} + 3\text{CaSO}_3$$

2. Predict the products of the following reaction, then write the balanced chemical reaction.

Sulphurous acid reacts with Iron(III)hydroxide

$$3H_2SO_3 + 2Fe(OH)_3 \rightarrow Fe_2(SO_3)_3 + 6H_2O$$

3. Predict the products of the reaction of nitrogen gas and hydrogen gas and write the balanced chemical equation.

$$N_2 + 3H_2 \rightarrow 2NH_3$$

4. Consider the following reactants:
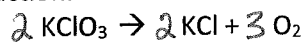
$$2 \text{ K} + \text{Cl}_2 \rightarrow 2\text{KCl}$$
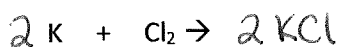
Complete and balance the chemical reaction, then answer the following question.
How many moles of K are needed to react with 2.45 moles of Cl_2?

2:1 ratio, so

2.45 mols × 2 = 4.90 moles of K are needed

5. Consider the following unbalanced reaction:

$$2 \text{ KClO}_3 \rightarrow 2\text{KCl} + 3 O_2$$

How many grams of KCl will be produced from the decomposition of 2.3 moles of $KClO_3$?

1:1 ratio, so 2.3 moles of KCl will be produced.

To find grams: 2.3 moles × $\frac{74.6g}{1 mol}$ = 171.58g   =
of KCl

170g

(proper sig figs)

6. How many moles of carbon dioxide and how many moles of water can be made from the combustion of 10.0 grams of C_3H_8?
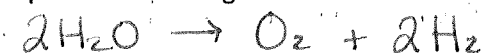
$$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

$$100g\ C_3H_8 \times \frac{1\ mol}{44\ g} = 0.227\ mols\ C_3H_8$$

So for CO_2 (1:3 ratio) moles $= 0.227\ mol \times 3$

$$= 0.681\ mol\ CO_2$$

For H_2O (1:4 ratio) moles $= 0.227\ mol \times 4$ $= 0.908\ mol\ H_2O$

7. When water decomposes, it turns into hydrogen gas and oxygen gas. How many grams of oxygen gas will be produced from the decomposition of 10.0 grams of water?
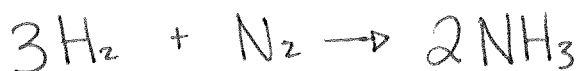
$$2H_2O \rightarrow O_2 + 2H_2$$

$$10.0\ g\ H_2O \times \frac{1\ mol}{18g/mol} = 0.556\ mol\ H_2O$$

For O_2 (2:1 ratio) moles $= \frac{0.556\ mol}{2} = 0.278\ mols\ O_2$

$$0.278\ mols\ O_2 \times \frac{32g}{1\ mol} = 8.90\ g \rightarrow of\ O_2\ gas$$

8. How many molecules of ammonia, NH_3, can be made from 10 grams of nitrogen gas, given enough hydrogen gas?

$$3H_2 + N_2 \rightarrow 2NH_3$$

$$10g\ N_2 \times \frac{1\ mol}{28\ g} = 0.357\ mol\ N_2$$

So NH_3 (2:1 ratio) has $0.357\ mol \times 2 = 0.714\ mol\ NH_3$

$$0.714\ mol \times \frac{6.02 \times 10^{23}\ molecules}{1\ mol}$$

$$= 4.30 \times 10^{23}\ molecules$$