Chemistry I

Chapter 11 Test Show All Work

Name Teacher

Date _____

1. Given the reaction,

$$2SO_{3(g)} \text{ --------> } 2S_{(s)} + 3O_{2(g)}$$

to produce 0.500 moles of sulfur:

a.) how many moles of $SO_{3(s)}$ are needed?

$SO_3 : S = 2:2 = 1:1$

$\therefore$ 0.500 moles SO_3

b.) how many liters of $O_{2(g)}$ would also be produced?

$\frac{3O_2}{2SO_3}(0.500 \text{ mole } SO_3) =$ 0.750 mole O_2

$0.750 \text{ mole}\left(\frac{22.4 L}{1 \text{ mol}}\right) =$ 16.8 L

2. For the reaction,

$$2H_{2(g)} + O_{2(g)} \text{ --------> } 2H_2O_{(g)}$$

how many moles of H_2O gas will be formed reacting with 8.318×10^{22} molecules of $O_{2(g)}$?

$8.318 \times 10^{22}\left(\frac{1 \text{ mole}}{6.02 \times 10^{23}}\right) =$ 0.1380 mole O_2

$0.1380 \text{ mole } O_2\left(\frac{2H_2O}{1O_2}\right) =$ 0.276 mole H_2O

3. If the following reaction occurs,

$$Al_2(SO_4)_3 + 3BaCl_2 \text{ --------> } 2AlCl_3 + 3BaSO_4$$

how many grams of barium chloride will be needed to react with 46.2 grams of aluminum sulfate?

46.2 g → ÷ 342.14 g/mole → 0.1350 mole → (×3) → 0.4051 mole → (×208.23 g/mole) → ? g = 84.4 g

4. If the following reaction occurs,

$$Al_4C_{3(s)} + 12H_2O_{(l)} \text{ ----------> } 3CH_{4(g)} + 4Al(OH)_{3(s)}$$

how many grams of aluminum hydroxide are produced along with 12.0 liters of CH_4?

$$12.0\ L\ CH_4 \left(\frac{1\ mole}{22.4\ L}\right) = 0.5357\ mole\ CH_4$$

$$0.5357\ mole\ CH_4 \left(\frac{4\ Al(OH)_3}{3\ CH_4}\right) = 0.7143\ mole\ Al(OH)_3$$

$$0.7143\ mole\ Al(OH)_3 \left(\frac{78.00\ g}{1\ mole}\right) = 55.7\ g\ Al(OH)_3$$

5. If 45.0 liters of oxygen are consumed when a candle made from paraffin ($C_{25}H_{52}$) is burned, what volume of carbon dioxide is produced? (Water is the other product.)

$$C_{25}H_{52(s)} + 38\,O_{2(g)} \longrightarrow 25\,CO_{2(g)} + 26\,H_2O_{(g)}$$

$$45.0\,L\,O_2\left(\frac{25\,CO_2}{38\,O_2}\right) = \boxed{29.6\,L\ CO_2}$$

6. In a double replacement reaction, when 6.52 grams of barium hypophosphite reacts with 6.52 grams of iron(III)peroxalate, what mass of barium compound is produced?

599.879 g/mol ↑ 423.76

$$Ba_3(PO_2)_2 + Fe_2(C_2O_5)_3 \longrightarrow 3\,BaC_2O_5 + 2\,FePO_2$$

6.52 g ÷ 537.93 g/mol = 0.01212 mol (Limiting)

6.52 g ÷ 423.76 = 0.01539 mol

0.01212 mol × 3 = 0.03636 mol

0.03636 mol × 241.35 = 8.78 g

What reactant, and what mass of it, is in excess?

$Fe_2(C_2O_5)_3$ Remaining = 0.01539 − 0.01087 = 0.00452 mole left

0.00452 mol × 423.76 g/mol = 1.92 g $Fe_2(C_2O_5)_3$ Left