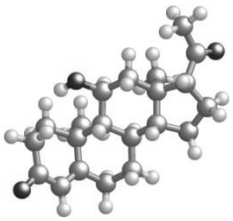

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Name: …… **( )**

Class: ……

Date: …… **/** …… **/** ……

Molar Volume of Gas Calculations

Question One:

a) Write the balanced chemical equation, including state symbols, for the thermal decomposition of calcium carbonate into calcium oxide and carbon dioxide.

b) Calculate the volume (in dm^3) of carbon dioxide gas that is produced when 25.0 g of calcium carbonate undergoes thermal decomposition.

Question Two:

a) Write the balanced chemical equation, including state symbols, for the reaction between magnesium carbonate and nitric acid.

b) Calculate the mass (in grams) of magnesium carbonate that is required to produce 36.0 dm^3 of carbon dioxide gas.

Question Three:

a) Manganese(IV) oxide reacts with concentrated hydrochloric acid to produce manganese(II) chloride, water and chlorine as the reaction products. Write the balanced chemical equation, including state symbols, for this reaction.

b) Calculate the volume (in dm^3) of chlorine gas that is produced when 8.7 g of manganese(IV) oxide reacts with an excess of concentrated hydrochloric acid.

Question Four:

The general equation for the reaction between a Group I metal carbonate and hydrochloric acid can be written as follows:

$$M_2CO_3(s) + 2HCl(aq) \rightarrow 2MCl(aq) + H_2O(l) + CO_2(g)$$

34.5 g of a Group I metal carbonate were found to produce 6.0 dm^3 of carbon dioxide gas when reacted with an excess of hydrochloric acid. Identify the Group I metal carbonate.

Question Five:

a) Propane gas (formula: C_3H_8) burns in oxygen to produce carbon dioxide and water. Write a balanced chemical equation for this reaction.

b) 44.0 g of propane is reacted with 80.0 g of oxygen. Which of the two chemicals, propane or oxygen, is the *limiting reagent* for the reaction? Calculate the volume (in dm^3) of carbon dioxide gas that is produced by the reaction.

Question Six:

a) Calcium carbide (formula: CaC_2) reacts with water to produce calcium hydroxide and ethyne gas (formula C_2H_2). Write the balanced chemical equation, including state symbols, for this reaction.

b) Calculate the volume of ethyne (in dm^3) that is produced when 8.0 g of calcium carbide reacts with an excess of water.

Question Seven:

The general equation for the reaction between a Group II metal and nitric acid can be written as follows:

$$M(s) + 2HNO_3(aq) \rightarrow M(NO_3)_2(aq) + H_2(g)$$

5.0 g of a Group II metal were found to produce 3.0 dm^3 of hydrogen gas when reacted with an excess of nitric acid. Identify the Group II metal.

Question Eight:

a) Methane gas reacts with steam to produce carbon monoxide and hydrogen. Write the balanced chemical equation, including state symbols, for this reaction.

b) Calculate the volume (in dm^3) of methane that is required to produce 1440 dm^3 of hydrogen gas.

Question Nine:

a) Nitrogen reacts with hydrogen to produce ammonia. Write the balanced chemical equation, including state symbols, for this reaction.

b) Calculate the volume (in dm^3) of hydrogen that is required to produce 288 dm^3 of ammonia gas.

Question Ten:

a) Write the balanced chemical equation, including state symbols, for the reaction between calcium carbonate and hydrochloric acid.

b) A sample of a new rock was analysed in a laboratory. Initial analysis showed that the rock was composed of a mixture of calcium carbonate and an inert mineral. 8.00 g of the rock sample was found to produce 1.50 dm^3 of carbon dioxide gas when reacted with an excess of hydrochloric acid. Calculate the percentage purity of calcium carbonate in the rock.

- Scan the QR code below for the answers to this assignment.

http://www.chemist.sg/mole/mole_gas_calc_ans.pdf