Name: _____
Period: ___

Gas Stoichiometry

(1) Hydrogen gas is combined with oxygen gas to form water. What volume of hydrogen gas and oxygen gas (at STP) would be required to produce 50.0 g of water?

(2) Carbon monoxide reacts with oxygen gas to produce carbon dioxide.

(a) If 100 L of carbon monoxide react, what volume of carbon dioxide would be produced (at STP)?

(b) If 80 L of oxygen gas react, what volume of carbon dioxide would be produced (at STP)?

(3) Carbon monoxide is combined with hydrogen gas to produce methanol (CH_3OH).

(a) If 450 mL of carbon monoxide react with 825 mL of hydrogen gas (at STP), which reactant is limiting and which is excess?

(b) What volume and mass of methanol will be produced (at STP)?

(4) Methane (CH_4) is combusted with oxygen gas to produce carbon dioxide and water vapour.

(a) What volume of methane gas reacts with 29.0 L of oxygen at 0.960 atm and 20 °C? What will the volume of each of the products be?

(b) What volume of oxygen reacts with 550 mL of methane at 8.60×10^4 Pa and 300 K? What will the volume of each of the products be?

(5) Hydrogen gas reacts with nitrogen gas to produce ammonia (NH_3)

(a) If 400 L of hydrogen react with 200 L of nitrogen gas at 2.76×10^7 Pa and 550 °C, which reactant is limiting and which is excess?

(b) What volume and mass of ammonia will be produced?

(c) If the percent yield for the reaction is 60.4%, what mass of ammonia will actually be obtained?

Answers:

(1) 62 L H_2, 31 L O_2

(2) (a) 100 L CO_2

(b) 1.6×10^2 L CO_2

(3) (a) lim: H_2 ex: CO

(b) 0.413 L and 0.590 g CH_3OH

(4) (a) 14.5 L CH_4, 14.5 L CO_2, 29.0 L H_2O

(b) 1.10 L O_2, 0.550 L CO_2, 1.10 L H_2O

(5) (a) lim: H_2 ex: N_2

(b) 267 L and 1.83×10^4 g NH_3

(c) 1.11×10^4 g NH_3