Reactions of Gases

Name: _____

1a) Balance this equation:

_____N_2 + _____H_2 ---> _____NH_3

b) Write the following molar ratios:

N_2 / H_2 _____

N_2 / NH_3 _____

H_2 / NH_3 _____

2a) Balance this equation:

_____H_2 + _____S ---> _____H_2S

b) Write the following molar ratios:

H_2 / H_2S _____

H_2 / S _____

H_2S / S _____

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3) In a gaseous reaction, 2 mol NO react with 1 mol O_2:

$$2\ NO\ (g) + O_2\ (g) \rightarrow 2\ NO_2\ (g)$$

a) Given the same conditions of temperature and pressure, what volume of O_2(g) would react with 4 L NO gas?

b) How many liters of O_2 are needed to make 350 L of NO_2?

4) Toxic carbon monoxide (CO) gas is produced when fossil fuels, such as gasoline, burn without sufficient oxygen gas. The CO can eventually be converted to CO_2 in the atmosphere. Automobile catalytic converters are designed to speed up this conversion:

Carbon monoxide gas + Oxygen gas → carbon dioxide gas

a) Write the balanced equation for this conversion.

b) How many moles of oxygen gas would be needed to convert 50.0 mol carbon monoxide to carbon dioxide?

c) What volume of oxygen gas would be needed to react with 968 L carbon monoxide?

5) A common way to produce ammonia (NH_3) is by the catalyzed reaction:

Hydrogen gas + Nitrogen gas → Ammonia Gas

a) Write the balanced equation for this conversion.

b) How many moles of hydrogen gas would be needed to convert 20.0 mol nitrogen to ammonia?

c) What volume of hydrogen gas would be needed to react with 182 L nitrogen gas?

6a) Write a balanced equation for the synthesis of water.

b) Suppose you had 20 moles of H_2 on hand and plenty of O_2, how many moles of H_2O could you make?

c) Suppose you had 20 moles of O_2 and enough H_2, how many moles of H_2O could you make?

7) Aluminum metal and hydrogen chloride react to form aluminum chloride and hydrogen gas.
a) Write the balanced equation:

b) How many moles of aluminum metal are needed to produce 3.33 moles of aluminum chloride?

c) How many moles of hydrogen chloride are needed to react with this number of moles of aluminum metal?

8) Aluminum bromide and sodium hydroxide react to form aluminum hydroxide and sodium bromide.
a) Write the balanced equation:

b) How many moles of sodium bromide can be formed from 1.55 moles of aluminum bromide?

c) How many moles of aluminum hydroxide may be formed from 4.65 moles of sodium hydroxide?

9) Ethane gas ($C_2H_{6)}$ reacts with oxygen gas to produce carbon dioxide gas and water vapor.
a) Write the balanced equation:

b) How many liters of oxygen gas will be needed to react with 14.2 L of ethane?

c) How many moles of carbon dioxide are produced by reacting 3.1 moles of oxygen?