Chemistry 20 - Unit 2 - Law of Combined Gases

Name: _____

1. Butane, $C_4H_{10(g)}$, is highly valued as a readily available hydrocarbon that can be used in a variety of applications, including household lighters.
    a. Write a balanced chemical equation, complete with state subscripts, detailing the complete combustion of butane.

$+O_2$

$2\,C_4H_{10(g)} + 13\,O_{2(g)} \rightarrow 8\,CO_{2(g)} + 10\,H_2O_{(g)}$

    b. If 3.0 L of butane are consumed in this reaction, what volume of carbon dioxide is produced?

$3.0\,L \times \frac{8}{2} = 12\,L\ of\ CO_2$

2. Gaseous hydrogen chloride, $HCl_{(g)}$, is often used to prepare hydrochloric acid for use in laboratory and industrial settings.
    a. Write a balanced chemical equation, complete with state subscripts, detailing the formation of hydrogen chloride from its elements.

$H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$

    b. If 1.5 mol of hydrogen are consumed in this reaction, how many mol of hydrogen chloride are produced?

$1.5\,mol \times \frac{2}{1} = 3.0\,mol\ HCl_{(g)}$

Chemistry 20 - Unit 2 - Law of Combined Gases

Name: _____

1. Butane, $C_4H_{10(g)}$, is highly valued as a readily available hydrocarbon that can be used in a variety of applications, including household lighters.
    a. Write a balanced chemical equation, complete with state subscripts, detailing the complete combustion of butane.

    b. If 3.0 L of butane are consumed in this reaction, what volume of carbon dioxide is produced?

2. Gaseous hydrogen chloride, $HCl_{(g)}$, is often used to prepare hydrochloric acid for use in laboratory and industrial settings.
    c. Write a balanced chemical equation, complete with state subscripts, detailing the formation of hydrogen chloride from its elements.

    d. If 1.5 mol of hydrogen are consumed in this reaction, how many mol of hydrogen chloride are produced?

3. The Fritz-Haber process was discovered in the early 20th century and revolutionized agriculture by allowing the mass production of ammonia, $NH_{3(g)}$, to take place.
    a. Write a balanced chemical equation, complete with state subscripts, detailing the formation of ammonia from its elements.

$1\ N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$

$1 : 3 : 2$
4.0mL ?

    b. If 4.0 mL of nitrogen are consumed in this reaction, what volume of ammonia is produced in litres?

$4.0mL \text{ of } N_2 \times \frac{2 \text{ of } NH_3}{1 \text{ of } N_2}$

$8.0mL \text{ of } NH_3 \times \frac{1L}{1000mL}$

4. Gas barbeques burn propane, $C_3H_{8(g)}$, using oxygen from the air.
    a. Write a balanced chemical equation, complete with state subscripts, detailing the complete combustion of propane.

$C_3H_{8(g)} + 5O_2 \rightarrow 3CO_2 + 4H_2O$

    b. If 5.00 L of propane are burned, what volume of carbon dioxide is produced in millilitres?

$5.00L \times \frac{3}{1} = 15.0L\ CO_2$

$15.0L \times \frac{1000mL}{1L} =$

3. The Fritz-Haber process was discovered in the early 20th century and revolutionized agriculture by allowing the mass production of ammonia, $NH_{3(g)}$, to take place.
    c. Write a balanced chemical equation, complete with state subscripts, detailing the formation of ammonia from its elements.

    d. If 4.0 mL of nitrogen are consumed in this reaction, what volume of ammonia is produced in litres?

$= 8.0 \times 10^{-3} L$

4. Gas barbeques burn propane, $C_3H_{8(g)}$, using oxygen from the air.
    c. Write a balanced chemical equation, complete with state subscripts, detailing the complete combustion of propane.

    d. If 5.00 L of propane are burned, what volume of carbon dioxide is produced in millilitres?

$1.50 \times 10^4 mL$