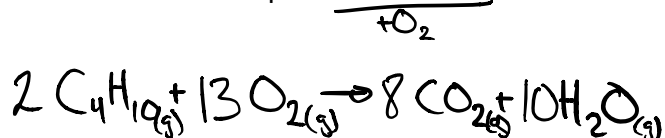


Chemistry 20 - Unit 2 - Law of Combined Gases

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.

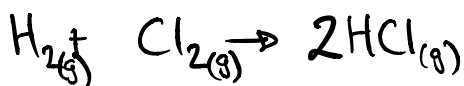


- b. If 3.0 L of butane are consumed in this reaction, what volume of carbon dioxide is produced?

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

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.



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

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

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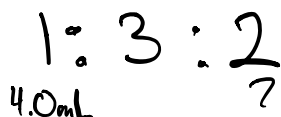
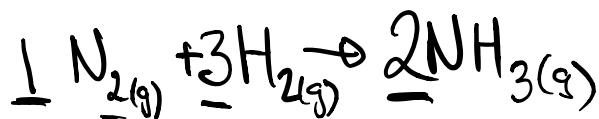
2. Gaseous hydrogen chloride, $HCl_{(g)}$, is often used to prepare hydrochloric acid for use in laboratory and industrial settings.

- 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, $\text{NH}_3(\text{g})$, to take place.

- a. Write a balanced chemical equation, complete with state subscripts, detailing the formation of ammonia from its elements.



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

$$4.0 \text{ mL of N}_2 \times \frac{2 \text{ of NH}_3}{1 \text{ of N}_2}$$

$$8.0 \text{ mL of NH}_3 \times \frac{1 \text{ L}}{1000 \text{ mL}}$$

4. Gas barbeques burn propane, $\text{C}_3\text{H}_8(\text{g})$, using oxygen from the air.
- a. Write a balanced chemical equation, complete with state subscripts, detailing the complete combustion of propane.



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

$$5.00 \text{ L} \times \frac{3}{1} = 15.0 \text{ L CO}_2$$

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

3. The Fritz-Haber process was discovered in the early 20th century and revolutionized agriculture by allowing the mass production of ammonia, $\text{NH}_3(\text{g})$, 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?

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

4. Gas barbeques burn propane, $\text{C}_3\text{H}_8(\text{g})$, 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?

$$1.50 \times 10^4 \text{ mL}$$