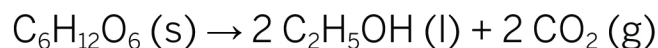


# → GAS STOICHIOMETRY ←

## → PROBLEMS ←

1. Fermentation is a complex chemical process of making wine by converting glucose into ethanol and carbon dioxide:



Calculate the volume of carbon dioxide gas produced at STP if 100 grams of glucose reacts with 100 g  $\text{C}_6\text{H}_{12}\text{O}_6$ .

2. Consider the reaction of zinc metal with hydrochloric acid to produce hydrogen and zinc chloride.

a. Write the balanced equation for this reaction.

b. Calculate the volume of hydrogen gas produced at STP if 25 grams of HCl react completely.

3. Write and then balance the combustion reaction for propane gas,  $\text{C}_3\text{H}_8$ .

a. If 5 grams of propane burn completely, what volume of carbon dioxide is produced at STP?

b. If 75 L of steam are produced at STP, what mass of propane must have burned?

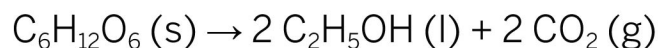
c. If 34.2 grams of propane are completely combusted, how many moles of steam will that produce?

# → GAS STOICHIOMETRY ←

## → PROBLEMS ←

### Answers

1. Fermentation is a complex chemical process of making wine by converting glucose into ethanol and carbon dioxide:



Calculate the volume of carbon dioxide gas produced at STP if 100 grams of glucose reacts with 100 g  $\text{C}_6\text{H}_{12}\text{O}_6$ .

$$100 \text{ g C}_6\text{H}_{12}\text{O}_6 \times (1 \text{ mol C}_6\text{H}_{12}\text{O}_6 / 180.06 \text{ g C}_6\text{H}_{12}\text{O}_6) \times (2 \text{ mol CO}_2 / 1 \text{ mol C}_6\text{H}_{12}\text{O}_6) \times (22.4 \text{ L CO}_2 / 1 \text{ mol CO}_2) = 24.9 \text{ L CO}_2$$

2. Consider the reaction of zinc metal with hydrochloric acid to produce hydrogen and zinc chloride.

a. Write the balanced equation for this reaction.



b. Calculate the volume of hydrogen gas produced at STP if 25 grams of HCl react completely.

$$25 \text{ g HCl} \times (1 \text{ mol HCl} / 36.46 \text{ g HCl}) \times (1 \text{ mol H}_2 / 2 \text{ mol HCl}) \times (22.4 \text{ L H}_2 / 1 \text{ mol H}_2) = 7.68 \text{ L H}_2$$

3. Write and then balance the combustion reaction for propane gas,  $\text{C}_3\text{H}_8$ .



a. If 5 grams of propane burn completely, what volume of carbon dioxide is produced at STP?

$$25 \text{ g C}_3\text{H}_8 \times (1 \text{ mol C}_3\text{H}_8 / 44.1 \text{ g C}_3\text{H}_8) \times (3 \text{ mol CO}_2 / 1 \text{ mol C}_3\text{H}_8) \times (22.4 \text{ L CO}_2 / 1 \text{ mol CO}_2) = 7.62 \text{ L CO}_2$$

b. If 75 L of steam are produced at STP, what mass of propane must have burned?

$$75 \text{ L H}_2\text{O} \times (1 \text{ mol H}_2\text{O} / 22.4 \text{ L H}_2\text{O}) \times (1 \text{ mol C}_3\text{H}_8 / 4 \text{ mol H}_2\text{O}) \times (44.1 \text{ g C}_3\text{H}_8 / 1 \text{ mol C}_3\text{H}_8) = 36.9 \text{ g C}_3\text{H}_8$$

c. If 34.2 grams of propane are completely combusted, how many moles of steam will that produce?

$$34.2 \text{ g C}_3\text{H}_8 \times (1 \text{ mol C}_3\text{H}_8 / 44.1 \text{ g C}_3\text{H}_8) \times (4 \text{ mol H}_2\text{O} / 1 \text{ mol C}_3\text{H}_8) = 3.1 \text{ mol H}_2\text{O}$$