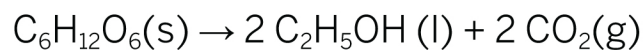


— STOICHIOMETRY —

WORKSHEET

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



A. Calculate the mass of ethanol produced if 500 grams of glucose reacts completely.

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

C. If 17.5 moles of ethanol were produced, how many moles of glucose were there initially?

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 moles of HCl needed to react completely with 8.25 moles of zinc.

C. Calculate the grams of zinc chloride produced if 0.238 grams of zinc react completely.

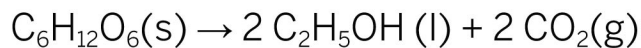
D. Calculate the volume of hydrogen gas produced at STP if 25 grams of HCl react completely.

— STOICHIOMETRY —

WORKSHEET

Answers

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



A. Calculate the mass of ethanol produced if 500 grams of glucose reacts completely.

$$500 \text{ g C}_6\text{H}_{12}\text{O}_6 \times (1 \text{ mol C}_6\text{H}_{12}\text{O}_6 / 180.06 \text{ g C}_6\text{H}_{12}\text{O}_6) \times (2 \text{ mol C}_2\text{H}_5\text{OH} / 1 \text{ mol C}_6\text{H}_{12}\text{O}_6) \\ \times (46.08 \text{ g C}_2\text{H}_5\text{OH} / 1 \text{ mol C}_2\text{H}_5\text{OH}) = 255.7 \text{ g C}_2\text{H}_5\text{OH}$$

B. Calculate the volume of carbon dioxide gas produced at STP if 100 grams of glucose reacts with 100 g C₆H₁₂O₆.

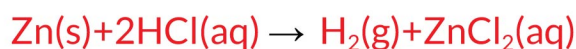
$$100 \text{ g C}_6\text{H}_{12}\text{O}_6 \times (1 \text{ mol C}_6\text{H}_{12}\text{O}_6 / 180.06 \text{ g C}_6\text{H}_{12}\text{O}_6) \times (2 \text{ mol CO}_2 / 1 \text{ mol C}_6\text{H}_{12}\text{O}_6) \\ \times (22.4 \text{ L CO}_2 / 1 \text{ mol CO}_2) = 24.9 \text{ L CO}_2$$

C. If 17.5 moles of ethanol were produced, how many moles of glucose were there initially?

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

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 moles of HCl needed to react completely with 8.25 moles of zinc.

$$8.25 \text{ mol Zn} \times (2 \text{ mol HCl} / 1 \text{ mol Zn}) = 16.5 \text{ mol HCl}$$

C. Calculate the grams of zinc chloride produced if 0.238 grams of zinc react completely.

$$0.238 \text{ g Zn} \times (1 \text{ mol Zn} / 65.39 \text{ g Zn}) \times (1 \text{ mol ZnCl}_2 / 1 \text{ mol Zn}) \times (136.29 \text{ g ZnCl}_2 / 1 \text{ mol ZnCl}_2) \\ = 0.496 \text{ g ZnCl}_2$$

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

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