



## MAKING ALCOHOLS

FERMENTATION

DIRECT HYDRATION

Answers all the questions below then check your answers

### 1 Fill in the Gaps

The fermentation of glucose requires the presence of a microorganism called \_\_\_\_\_.

2. Fermentation is an \_\_\_\_\_ process, meaning it occurs in the absence of oxygen.
3. The direct hydration of ethene uses \_\_\_\_\_ as a catalyst.
4. Which of the following is NOT a product of glucose fermentation?
  - (a) Ethanol
  - (b) Carbon dioxide
  - (c) Water
  - (d) Oxygen

5. What is the optimal temperature range for fermentation to occur efficiently?
- (a) 0-10 °C
  - (b) 15-35 °C
  - (c) 50-60 °C
  - (d) 80-90 °C
6. Which of the following statements about ethanol is FALSE?
- (a) Ethanol is a type of alcohol.
  - (b) Ethanol is used as a fuel.
  - (c) Ethanol is a gas at room temperature.
  - (d) Ethanol is soluble in water.
7. Which of the following is the chemical equation for the hydration of ethene?
- (a)  $C_2H_4 + H_2O \rightarrow C_2H_5OH$
  - (b)  $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$
  - (c)  $C_2H_5OH \rightarrow C_2H_4 + H_2O$
  - (d)  $C_2H_4 + O_2 \rightarrow 2CO_2 + 2H_2O$

8. Match the following terms with their definitions:

<i>fermentation</i>
<i>hydration</i>
<i>yeast</i>
<i>Phosphoric acid</i>
<i>ethanol</i>

<i>A biological process that converts sugars into ethanol and carbon dioxide.</i>
<i>A type of alcohol produced by both fermentation and hydration of ethene.</i>
<i>A catalyst used in the hydration of ethene.</i>
<i>A type of microorganism used in fermentation.</i>
<i>A chemical reaction where water is added to a molecule.</i>

9. Explain the role of yeast in the fermentation process, including the enzyme
10. Compare and contrast the conditions (temperature, pressure) required for fermentation and hydration of ethene. Why do these conditions differ?

## Answers

### 1 Fill in the Gaps

The fermentation of glucose requires the presence of a microorganism called \_\_\_\_\_.

Answer: Yeast

2. Fermentation is an \_\_\_\_\_ process, meaning it occurs in the absence of oxygen.

Answer: anaerobic

3. The direct hydration of ethene uses \_\_\_\_\_ as a catalyst.

Answer: Phosphoric acid

4. Which of the following is NOT a product of glucose fermentation?

(a) Ethanol

(b) Carbon dioxide

(c) Water

(d) Oxygen

Answer: d

5. What is the optimal temperature range for fermentation to occur efficiently?

(a) 0-10 °C

(b) 15-35 °C

(c) 50-60 °C

(d) 80-90 °C

Answer: b

6. Which of the following statements about ethanol is FALSE?

- (a) Ethanol is a type of alcohol.
- (b) Ethanol is used as a fuel.
- (c) Ethanol is a gas at room temperature.
- (d) Ethanol is soluble in water.

Answer: c

7. Which of the following is the chemical equation for the hydration of ethene?

- (a)  $C_2H_4 + H_2O \rightarrow C_2H_5OH$
- (b)  $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$
- (c)  $C_2H_5OH \rightarrow C_2H_4 + H_2O$
- (d)  $C_2H_4 + O_2 \rightarrow 2CO_2 + 2H_2O$

Answer: a

8. Match the following terms with their definitions:

fermentation	A biological process that converts sugars into ethanol and carbon dioxide.
hydration	A type of alcohol produced by both fermentation and hydration of ethene.
yeast	A catalyst used in the hydration of ethene.
Phosphoric acid	A type of microorganism used in fermentation.
ethanol	A chemical reaction where water is added to a molecule.

9. Explain the role of yeast in the fermentation process, including the enzyme involved and the reactions they catalyze.

Yeast contains enzymes zymase that catalyze the breakdown of glucose into ethanol and carbon dioxide.

10. Compare and contrast the conditions (temperature, pressure) required for fermentation and hydration of ethene. Why do these conditions differ?

Fermentation occurs at moderate temperatures (25-35°C) and atmospheric pressure, as these are the optimal conditions for yeast activity. Hydration of ethene requires higher temperatures (300°C) and pressures (60-70 atm) to overcome the activation energy of the reaction and increase the yield of ethanol.