

## ETHANOL – TEST 1

### QUESTION 1

Which of the following reactions represents the production of ethanol for use as a fuel?

- A  $CH_2CH_2 \xrightarrow{H_3PO_4/H_2O} CH_3CH_2OH$
- B  $CH_3CH_2OH + 3\frac{1}{2}O_2 \rightarrow 2CO_2 + 3H_2O$
- C  $C_6H_{12}O_6 \rightarrow 2CH_3CH_2OH + 2CO_2 + energy$
- D  $CH_3CH_2Cl + OH^- \rightarrow CH_3CH_2OH + Cl^-$

### QUESTION 2

The fermentation of glucose to ethanol

- A will produce a 90% yield of ethanol
- B produces a mixture of alcohols
- C needs high temperatures
- D is done in an acidic environment

### QUESTION 3

Ethanol is not usually formed from

- A soy beans
- B corn
- C sugarcane
- D wheat

### QUESTION 4

Which of the following may not be an advantage of using ethanol as a fuel source?

- A It is renewable
- B Ethanol burns more cleanly than petroleum
- C Ethanol is formed from the fermentation of food crops
- D If renewable energy sources are used during its production, then ethanol can be considered as carbon neutral.

**QUESTION 1**

Explain how ethanol is purified after the fermentation process.

***Solution***

**QUESTION 2**

Why does the fermentation process stop once 10 to 20% of the sugars have been consumed?

***Solution***

**QUESTION 3**

What are some disadvantages of using ethanol?

***Solution***

## SOLUTIONS

**QUESTION 1** Answer is C

**QUESTION 2** Answer is D

**QUESTION 3** Answer is A

**QUESTION 4** Answer is C

### QUESTION 5

The ethanol is collected and separated via distillation. The mixture is heated and since the ethanol has a lower boiling point than water, it will evaporate first. The evaporated ethanol is collected and condensed. Any remaining water can be removed by passing it over quicklime to produce 100% ethanol.

### QUESTION 6

Ethanol is toxic to yeast so once 10-20% of the sugars have been converted, the mixture is too toxic for the yeast and the enzymes needed for the fermentation are denatured. This prevents further fermentation from occurring.

### QUESTION 7

- Ethanol releases less energy per unit of volume than petroleum does.
- Large amounts of land are needed to grow the crops. This can lead to soil erosion, deforestation, pollution to water ways and salinity.
- There may be environmental issue surrounding the disposal of waste materials that result from the production of ethanol.
- Not all car engines are designed to burn ethanol.