

APOLLO

Energy from fuels

SL

Chemistry

First assessment 2025

6 questions | questions

8. Ethanol is a biofuel that can be made from glucose. Glucose is formed by the biological fixation of carbon through photosynthesis.

(a) (i) State the equation for photosynthesis.

[1]

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(ii) Outline **two** advantages of using ethanol as a fuel instead of gasoline (petrol).

[2]

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(b) Calculate the increase in temperature of a sample of 500.0 cm^3 of water heated by the combustion of 4.00 g of ethanol. Use sections 2 and 14 of the data booklet.

[2]

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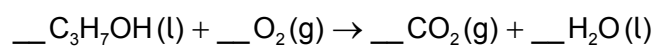
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Answers written on this page
will not be marked.



- 18.** Which of the following statements best describes an environmental implication associated with the use of fossil fuels?
- A. Increased biodiversity due to the establishment of habitats through mining
 - B. Decreased emission of greenhouse gases leading to global cooling
 - C. Enhanced soil fertility due to the deposition of coal dust
 - D. Acid rain formation from the release of sulfur dioxide and nitrogen oxides

15. What is the sum of the coefficients when 1 mol of propan-1-ol, $\text{C}_3\text{H}_7\text{OH}$, undergoes complete combustion?



- A. 11.5
- B. 12
- C. 12.5
- D. 13

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17. Which statement is a disadvantage of using biofuels instead of fossil fuels?

- A. Land is used that could be used to grow food.
- B. Combustion releases more energy per mol of fuel.
- C. Emissions of CO_2 to the atmosphere are lower overall.
- D. Crop waste can be used as a fuel.

18. Which is a renewable energy source?

- A. natural gas
- B. uranium
- C. coal
- D. wood

4. Heptadecane, $C_{17}H_{36}$, can be extracted from crude oil or cactus plants.

(a) Write an equation for the complete combustion of $C_{17}H_{36}$. [1]

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(b) The enthalpy of combustion of $C_{17}H_{36}$ is $-11\,350\text{ kJ mol}^{-1}$.

(i) Calculate the maximum energy produced when 2.00 g of $C_{17}H_{36}$ is combusted. [2]

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(ii) Determine the maximum temperature change when 500.0 cm^3 of water is heated by a 2.00 g sample of $C_{17}H_{36}$. [2]

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(iii) Outline **two** assumptions made in the calculation in (b)(ii). [2]

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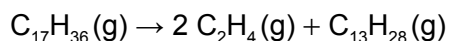
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(Question 4 continued)

- (c) Explain why biofuels contribute less to climate change than fossil fuels. [1]

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- (d) Heptadecane can be broken down into smaller molecules. Consider the reaction:



Determine the standard enthalpy change, $\Delta H^\ominus$, for the reaction stated, using section 12 of the data booklet. [3]

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- (e) Ethene can be converted to ethanol in one reaction. State the equation for this reaction. [1]

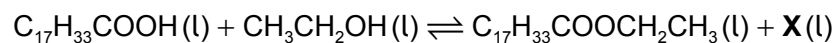
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(Question 4 continued)

- (f) Ethanol reacts with oleic acid to produce ethyl oleate.



- (i) Identify the side product **X**(l). [1]

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- (ii) Calculate the atom economy of the reaction. [1]

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- (iii) Discuss why the atom economy of a reaction is an important consideration when evaluating the impact of a reaction in an industrial process. [2]

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**Turn over**

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