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VCE Chemistry $\frac{3}{4}$
Fuels [1.5]
Test

20 Marks. 1 Minute Reading. 16 Minutes Writing.

Results:

Test Questions	_____ / 15
Extension Question	_____ / 5



Section A: Test Questions (15 Marks)

Question 1 (4 marks)

Tick whether the following statements are **True** or **False**.

Statement	True	False
a. Greenhouse gases are bad for the environment due to their toxicity.		
b. Coal is formed from the fossilisation of plant and animal matter.		
c. Crude oil is a pure chemical from which petrol is obtained.		
d. After bioethanol is produced, it is typically distilled to remove waste water and other impurities.		
e. Biodiesel is formed from the fermentation of sugars in the presence of yeast.		
f. There are 5 main macronutrients our bodies need: Fats, Oils, Carbohydrates, Proteins and Vitamins.		
g. Humans primarily obtain energy by cellular respiration, whereby the oxidation of protein occurs.		
h. Fats provide more energy per gram than carbohydrates and proteins.		

Space for Personal Notes

Question 2 (2 marks)

Explain the difference between a renewable and a non-renewable fuel.

Question 3 (5 marks)

A digester processed a mass of organic waste which produced a certain volume of biogas at standard conditions.

- a. Explain how biogas is formed, and state which chemicals typically comprise a sample of biogas. (2 marks)

- b. Given that, 220 MJ of energy can theoretically be evolved from the methane present in the biogas. Calculate the volume of methane present in kL. (2 marks)

- c. If 65% of the biogas was comprised of CH₄, calculate the total volume of biogas, in kL, which was generated in the digester. (1 mark)

Question 4 (4 marks)

Grace is a student discussing viable energy sources for her car with her parents. She proposes that she uses E10 petrol for her car, which is a blend comprising 90% petrol and 10% ethanol, as the inclusion of ethanol can be environment-friendly.

- a. Explain how ethanol can be sourced renewably, ensuring to include any relevant equations in your answer. (2 marks)

- b. Grace's parents are concerned that E10 petrol will not be the best option for her car in terms of fuel performance. Explain why this is the case and suggest an alternative fuel which would alleviate their concerns. (2 marks)

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Section B: Extension Question (5 Marks)**Question 5 (5 marks)**

Green Chemistry is an upcoming field which has gained a wealth of attention in recent years. As a result, Sahanya has been tasked with determining whether certain fuel sources are environmentally viable or not.

- a. Write the balanced chemical equation for photosynthesis. (1 mark)

- b. Using your answer to **part a.**, or otherwise, explain why some biofuels are considered 'carbon neutral'. (2 marks)

c.

- i. Sahanya suggests that no biofuels are truly carbon neutral. Provide one reason to support her claim. (1 mark)

- ii. State **one** Green chemistry principle which is relevant to Sahanya's research. Justify your reasoning. (1 mark)

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VCE Chemistry $\frac{3}{4}$

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