Paper 1

Questions are applicable for both core and extended candidates

1 Which statement describes methane?

A It is an alcohol.

B It is an unsaturated molecule.

C It contains carbon, hydrogen and oxygen atoms only.

D Its molecules contain four single covalent bonds.

2 Which equation represents the cracking of an alkane?

A $3C_2H_4 \rightarrow C_6H_{12}$

B $C_6H_{12} + H_2 \rightarrow C_6H_{14}$

C $C_6H_{14} \rightarrow 6C + 7H_2$

D $C_6H_{14} \rightarrow C_2H_4 + C_4H_{10}$

3 Which statement about ethane is correct?

A It decolourises bromine water.

B It burns in excess oxygen to form water and carbon dioxide.

C Its molecular formula is C_2H_4.

D Its atoms are joined together by ionic bonding.

4 Some properties of colourless liquid L are listed.

- It boils at 65 °C.
- When added to water, two layers form which do not mix.
- It does not react with sodium carbonate.
- It has no effect on bromine water.

What is L?

A ethanol

B hexane

C hexene

D ethanoic acid

5 The fuel ethane, C_2H_6, burns in air to form carbon dioxide and water.

$$2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$$

Which statement about burning ethane is correct?

A When one molecule of ethane burns, one molecule of water is formed.

B The number of atoms at the end of the reaction is the same as at the start.

C During the reaction there is a decrease in the number of molecules.

D The reaction is endothermic.

6 Which reactions produce carbon dioxide?

1 addition of dilute nitric acid to copper(II) carbonate

2 heating zinc carbonate

3 combustion of methane

A 1,2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 3 only

7 Which type of covalent bond is found in both a molecule of methane and a molecule of ethane?

A a double bond between a carbon atom and a hydrogen atom

B a double bond between two carbon atoms

C a single bond between a carbon atom and a hydrogen atom

D a single bond between two carbon atoms

Paper 2

Questions are applicable for both core and extended candidates unless indicated in the question

8 Methane and chlorine react to form chloromethane.

Which row describes the necessary reaction condition and the type of reaction? **(extended only)**

	reaction condition	type of reaction
A	ultraviolet light	substitution
B	nickel catalyst	substitution
C	nickel catalyst	addition
D	ultraviolet light	addition

9 The structural formulae of two hydrocarbons are shown.

$CH_3CH_2CH_2CH_3$ $CH_3CH(CH_3)CH_3$

Which statement about the hydrocarbons is correct?

A They are both alkenes.

B They decolourise aqueous bromine.

C They are structural isomers.

D They undergo addition reactions.

10 When a mixture of methane and chlorine is exposed to ultraviolet light, a reaction takes place.

Which statements about this reaction are correct? **(extended only)**

1 It is an addition reaction.

2 The ultraviolet light provides the activation energy.

3 An equation for the reaction is $CH_4 + Cl_2 \rightarrow CH_2Cl_2 + H_2$.

4 CH_3Cl is made in the reaction.

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

11 Ethane is used as a fuel.

Which equation shows the complete combustion of ethane?

A $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

B $2C_2H_6 + 5O_2 \rightarrow 4CO + 6H_2O$

C $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$

D $C_2H_4 + 2O_2 \rightarrow 2CO + 2H_2O$

12 Which equation representing a reaction of methane is correct? **(extended only)**

A $CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$

B $CH_4 + Cl_2 \rightarrow CH_4Cl_2$

C $CH_4 + Cl_2 \rightarrow CH_2Cl_2 + H_2$

D $2CH_4 + 2Cl_2 \rightarrow 2CH_3Cl + Cl_2 + H_2$