

Q1. This question is about hydrocarbons.

- (a) The names and formulae of three hydrocarbons in the same homologous series are:

Ethane	C_2H_6
Propane	C_3H_8
Butane	C_4H_{10}

The next member in the series is pentane. What is the formula of pentane?

(1)

- (b) Which homologous series contains ethane, propane and butane?

Tick **one** box.

Alcohols

Alkanes

Alkenes

Carboxylic acids

(1)

- (c) Propane (C_3H_8) is used as a fuel.

Complete the equation for the complete combustion of propane.



(2)

- (d) Octane (C_8H_{18}) is a hydrocarbon found in petrol. Explain why octane is a hydrocarbon.

(2)

- (e) The table below gives information about the pollutants produced by cars using diesel or petrol as a fuel.

Fuel	Relative amounts of pollutants		
	Oxides of Nitrogen	Particulate matter	Carbon dioxide
Diesel	31	100	85
Petrol	23	0	100

Compare the pollutants from cars using diesel with those from cars using petrol.

(3)

(f) Pollutants cause environmental impacts. Draw **one** line from each pollutant to the environmental impact caused by the pollutant.

Pollutant	Environmental impact caused by the pollutant
	Acid rain
Oxides of nitrogen	Flooding
	Global dimming
Particulate matter	Global warming
	Photosynthesis

(2)

(Total 11 marks)

Q2. This question is about fuels. Octane (C_8H_{18}) is a hydrocarbon in petrol.

(a) What type of carbon compound is octane, C_8H_{18} ? Tick **one** box.

Alcohol	<input type="checkbox"/>
Alkane	<input type="checkbox"/>
Carboxylic acid	<input type="checkbox"/>
Ester	<input type="checkbox"/>

(1)

(c) Oxygen is needed to burn fuels. Name the source of the oxygen needed to burn fuels.

(1)

(d) Particulates and sulfur dioxide are pollutants produced when some fuels burn. Draw **one** line from each pollutant to the polluting effect.

Pollutant	Polluting effect
	Acid rain
Particulates	Global dimming
	Global warming
Sulfur dioxide	Landfill
	Sewage sludge

(2)

(e) Which **two** gases are produced when fuels burn in car engines? Tick **two** boxes.

Ammonia	<input type="checkbox"/>
Carbon dioxide	<input type="checkbox"/>
Carbon monoxide	<input type="checkbox"/>
Nitrogen	<input type="checkbox"/>
Oxygen	<input type="checkbox"/>

(2)

(f) Vehicles produce most of the atmospheric pollution in cities. How could the atmospheric pollution in cities be reduced? Tick **two** boxes.

Build more roads in cities	<input type="checkbox"/>
Build new car factories	<input type="checkbox"/>

Develop fuel efficient engines

Make car tax cheaper

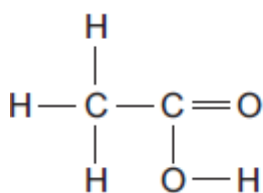
Use electric cars

(2)

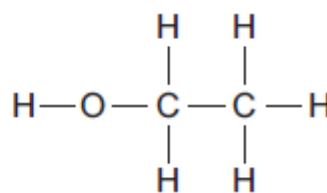
(Total 8 marks)

Q3. The diagrams represent two compounds, **A** and **B**.

Compound A



Compound B



- (a) (i) Compound **B** is an alcohol. Name compound **B**.

(1)

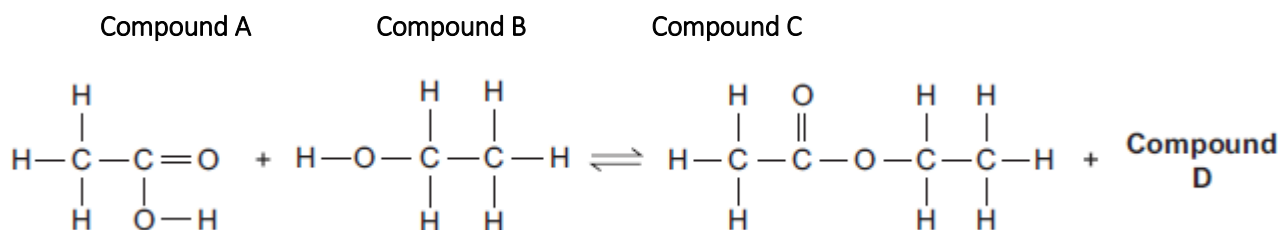
- (ii) Use the correct answer from the box to complete the sentence.

burned decomposed oxidised

To form compound **A**, compound **B** is _____

(1)

- (b) Compounds **A** and **B** react to produce compound **C** and compound **D**.



- (i) What is the formula of compound **D**?

(1)

- (ii) Compound **C** is an ester. Name compound **C**.

(1)

(iii) State **one** use of esters.

(1)

(Total 5 marks)

Q4. This question is about organic compounds.

(a) The table below shows the boiling point, flammability and viscosity of $C_{18}H_{38}$ compared with the other hydrocarbons shown in the equation.

	Boiling point	Flammability	Viscosity
A	highest	lowest	highest
B	highest	lowest	lowest
C	lowest	highest	highest
D	lowest	highest	lowest

Which letter, **A**, **B**, **C** or **D**, shows how the properties of $C_{18}H_{38}$ compare with the properties of C_2H_4 , C_3H_6 , C_4H_8 and C_6H_{14} ?

Tick **one** box.

A

B

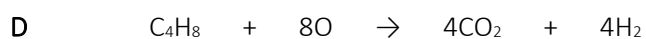
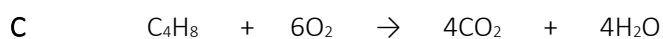
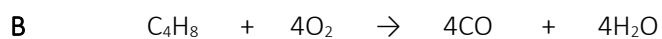
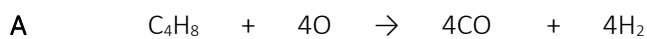
C

D

(1)

(b) The hydrocarbon C_4H_8 was burnt in air. Incomplete combustion occurred.

Which equation, **A**, **B**, **C** or **D**, correctly represents the incomplete combustion reaction?



Tick **one** box.

A

B

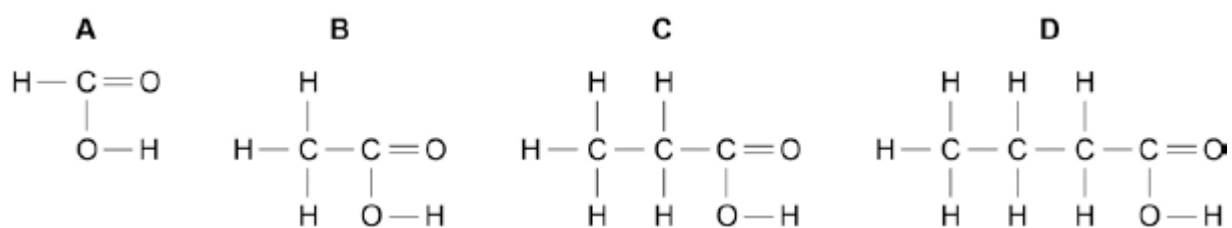
C

D

(1)

(c) Propanoic acid is a carboxylic acid.

Which structure, **A**, **B**, **C** or **D**, shows propanoic acid?



Tick **one** box.

A

B

C

D

(1)

(d) Propanoic acid is formed by the oxidation of which organic compound?

Tick **one** box.

Propane

Propene

Propanol

Polyester

(1)

(Total 4 marks)

Mark schemes

Q1.

(a) C_5H_{12} 1

(b) Alkanes 1

(c) (3) CO_2 1

(4) H_2O 1

allow for 1 mark
4 CO_2 + 3 H_2O

(d) contains hydrogen and carbon 1

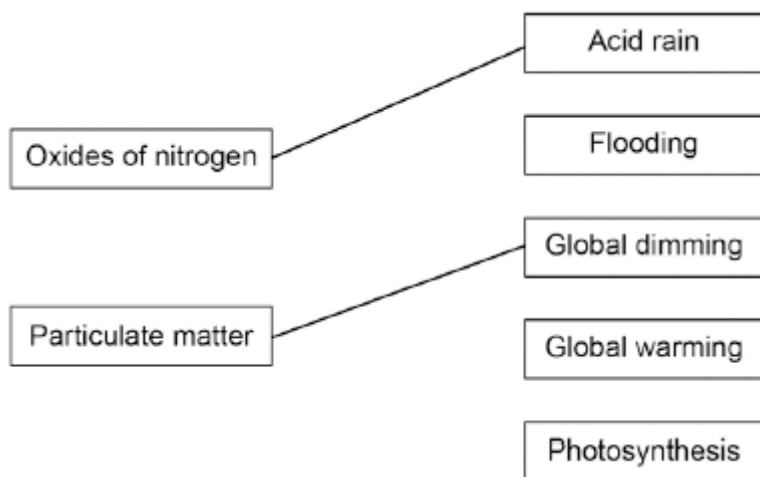
(hydrogen and carbon) only 1

(e) (*diesel*)
produces more oxides of nitrogen
allow converse answers in terms of petrol 1

produces (more) particulate matter 1

produces less carbon dioxide 1

(f)



2

[11]

Q2.

(a) alkane

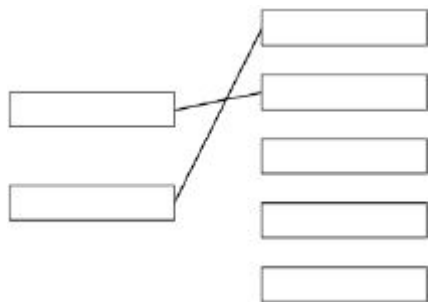
1

(b) air

allow atmosphere

1

(c)



particulates – global dimming

1

sulfur dioxide – acid rain

1

(d) carbon dioxide

1

carbon monoxide

1

(e) develop fuel efficient engines

use electric cars

1

[9]

Q3.

(a) (i) ethanol

1

(ii) oxidised

1

(b) (i) H₂O

1

(ii) ethyl ethanoate

1

(iii) any **one** from:

- flavourings
- perfumes
- solvents
- plasticisers

allow any correct use of esters

1

[7]

Q4.

(a) A

1

(b) B

1

(c) C

1

(d) Propanol

1

[5]