

Y11 Chemistry 6th Form Induction – Organic Chemistry Questions

Task 1: Thalidomide Research Task

Find the answers to following questions:

- What is thalidomide?
- Who and when was it invented?
- What was it originally supposed to be used for?
- What was it commonly used for in the 1950s and 1960s?
- What problems did doctors start to observe?

Task 2: Practice Questions

Q1. This question is about fuels. Octane (C_8H_{18}) is a hydrocarbon in petrol.

- (a) Cracking breaks down large hydrocarbon molecules into smaller hydrocarbon molecules. Which hydrocarbon molecule can be cracked to produce octane, C_8H_{18} ?

Tick **one** box.

C_4H_8

C_4H_{10}

C_8H_6

$C_{12}H_{26}$

(1)

- (b) What type of carbon compound is octane, C_8H_{18} ?

Tick **one** box.

Alcohol

Alkane

Carboxylic acid

Ester

(1)

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

Complete Combustion

(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

Build new car factories

Develop fuel efficient engines

Make car tax cheaper

Use electric cars

(2)
(Total 9 marks)

Q2. This question is about hydrocarbons. The table gives information about four hydrocarbons. The hydrocarbons are four successive members of a homologous series.

Hydrocarbon	Formula	Boiling point in °C
A	C ₄ H ₁₀	0
B		36
C	C ₆ H ₁₄	69
D	C ₇ H ₁₆	98

- (a) What is the formula of hydrocarbon **B**? Tick (✓) **one** box.

C₄H₁₂

C₅H₁₂

C₅H₁₂

C₆H₁₂

(1)

(b) What is the simplest ratio of carbon : hydrogen atoms in a molecule of hydrocarbon **A**?

Ratio = 2 : _____

(1)

(c) Which hydrocarbon is a gas at room temperature (25 °C)? Tick (✓) **one** box.

A **B** **C** **D**

(1)

(d) Which hydrocarbon is most flammable? Tick (✓) **one** box.

A **B** **C** **D**

(1)

(e) Which **two** substances are produced when a hydrocarbon **completely** combusts in air?

Tick (✓) **two** boxes.

Carbon

Carbon dioxide

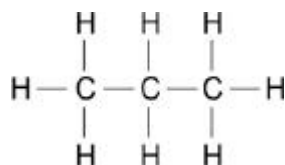
Hydrogen

Sulfur dioxide

Water

(2)

The diagram shows the displayed structure of a hydrocarbon molecule.



(f) What is the name of the hydrocarbon in the diagram above? Tick (✓) **one** box.

Butane

Ethane

Methane

Propane

(1)

(g) Calculate the relative formula mass (M_r) of the hydrocarbon in the diagram above.

Relative atomic masses (A_r): H = 1 C = 12

Relative formula mass (M_r) = _____

(2)

(Total 9 marks)

Q3. The table below gives information about four alcohols.

Alcohol	Formula	Melting point in °C	Boiling point in °C
Methanol	CH ₃ OH	-94	65
Ethanol	CH ₃ CH ₂ OH	-118	78
Propanol	CH ₃ CH ₂ CH ₂ OH	-129	97
Butanol	CH ₃ CH ₂ CH ₂ CH ₂ OH	-89	118

(a) Which alcohol in the table is liquid over the greatest temperature range?

(1)

(b) Which statement is correct?

Tick **one** box.

A molecule of ethanol has 5 hydrogen atoms

Butanol has the highest boiling point

Methanol has the largest molecules

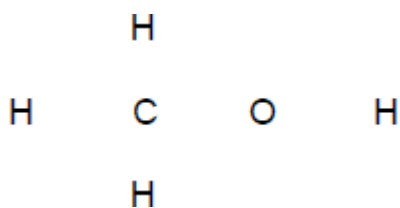
Propanol has the highest melting point

(1)

(c) A molecule of methanol has five single covalent bonds.

Draw the missing bonds in **Figure 1** to complete the displayed formula for methanol.

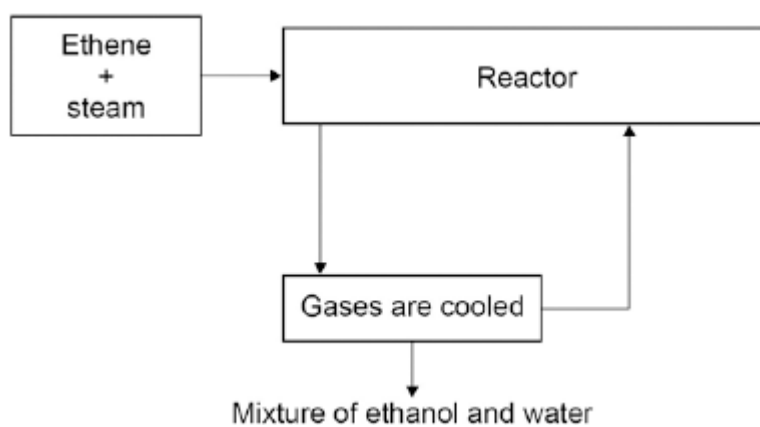
Figure 1



(1)

(d) **Figure 2** shows a flow diagram of the process to produce ethanol.

Figure 2



Complete the word equation for the reaction to produce ethanol.



(1)

(e) What happens to the unreacted ethene?

(1)

(f) Wine contains ethanol. A bottle of wine was left open in air. After a few days, the wine tasted of vinegar. Vinegar is a solution of ethanoic acid in water.

Explain how oxidation causes the wine to taste of vinegar after a few days.

(3)

(Total 8 marks)

Q4. 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.

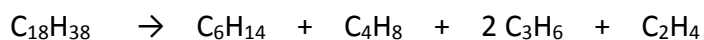
(3)

- (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)

Q5. This question is about organic compounds. Hydrocarbons can be cracked to produce smaller molecules. The equation shows the reaction for a hydrocarbon, $C_{18}H_{38}$



- (a) Which product of the reaction shown is an alkane?

Tick **one** box.

C_2H_4

C_3H_6

C_4H_8

C_6H_{14}

(1)

- (b) 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

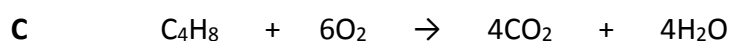
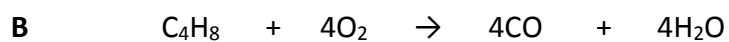
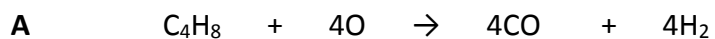
D

(1)

- (c) 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

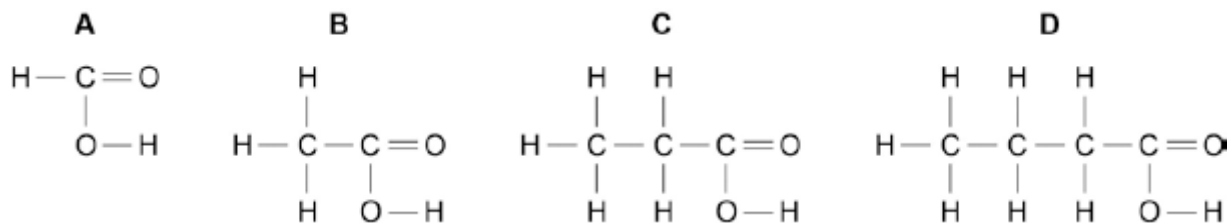
B

C

D

(1)

(d) Propanoic acid is a carboxylic acid. Which structure, **A**, **B**, **C** or **D**, shows propanoic acid?



Tick **one** box.

A

B

C

D

(1)

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

Tick **one** box.

Propane

Propene

Propanol

Polyester



(1)
(Total 5 marks)

