Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: Alkanes

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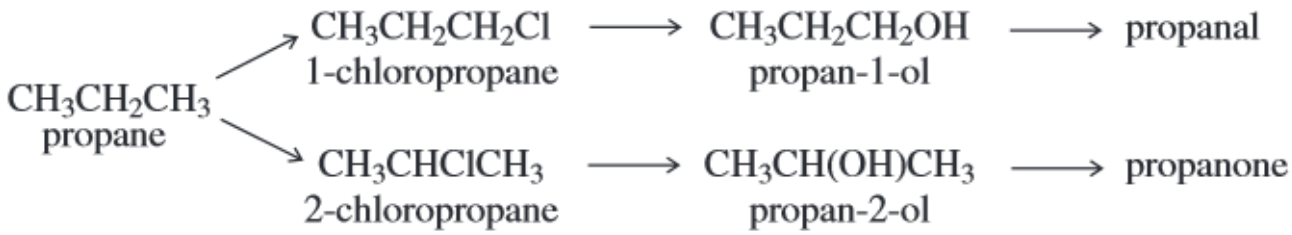
Name of the Student:_____
Max. Marks : 25 Marks **Time : 25 Minutes**

Q1.

Consider the following scheme of reactions.



(a) State the type of structural isomerism shown by propanal and propanone.

_____

(1)

(b) A chemical test can be used to distinguish between separate samples of propanal and propanone.

Identify a suitable reagent for the test.
State what you would observe with propanal and with propanone.

Test reagent _____

Observation with propanal _____

Observation with propanone _____

(3)

(c) State the structural feature of propanal and propanone which can be identified from their infrared spectra by absorptions at approximately 1720 cm^{-1}.

_____

(1)

(d) The reaction of chlorine with propane is similar to the reaction of chlorine with methane.

(i) Name the type of mechanism in the reaction of chlorine with methane.

_____

(1)

(ii) Write an equation for each of the following steps in the mechanism for the reaction of chlorine with propane to form l-chloropropane ($CH_3CH_2CH_2Cl$).

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Initiation step

_____

First propagation step

_____

Second propagation step

_____

A termination step to form a molecule with the empirical formula C_3H_7

_____

(4)

(e) High resolution mass spectrometry of a sample of propane indicated that it was contaminated with traces of carbon dioxide.

Use the data in the table to show how precise M_r values can be used to prove that thesample contains both of these gases.

Atom	Precise relative atomic mass
^{12}C	12.00000
^{1}H	1.00794
^{16}O	15.99491

_____

_____

_____

(2)

(Total 12 marks)

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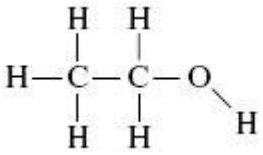
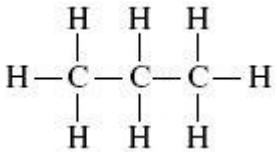
Q2.

(a) Two organic compounds with similar relative molecular masses are shown below.



Ethanol



Propane

(i) State the type of bond present between the C and H atoms in both of these molecules. Explain how this type of bond is formed.

Type of bond _____

Explanation _____

(2)

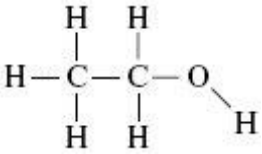
(ii) State the strongest type of intermolecular force present in each compound.

Liquid ethanol _____

Liquid propane _____

(2)

(b) Ethanol dissolves in water. Draw a diagram to show how one molecule of ethanol interacts with one molecule of water in the solution. Include partial charges and all lone pairs. The ethanol molecule has been drawn for you.



(3)

(c) Ethanol was the fuel used in the first mass-produced car, the Model T Ford.

(i) Write an equation which shows how ethanol burns completely in air to form carbon dioxide and water as the only products.

_____

(1)

(ii) Suggest **one** environmental problem caused by incomplete combustion of ethanol in a car engine.

_____

_____

(1)

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(iii) Suggest **one** economic problem for the car user caused by incomplete combustion of ethanol in the car engine.

_____

_____

(1)

(d) Propane is also used as a fuel, although sometimes it can be contaminated with sulfur-containing impurities. When this propane burns, these impurities form sulfur dioxide.

(i) State how the sulfur dioxide can be removed from the waste gases produced when this propane is burned on a large scale in industry. Suggest a reason why the method you have stated may not be 100% efficient.

How removed _____

_____

Reason for less than 100% efficiency _____

_____

(2)

(ii) Although propane has a boiling point of –42 °C, it is usually supplied as a liquid for use in camping stoves. Suggest why it is supplied as a liquid.

_____

_____

(1)

(Total 13 marks)

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