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

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

Q1.

Ethanal reacts with potassium cyanide, followed by dilute acid, to form 2-hydroxypropanenitrile.

(a) Name the mechanism for the reaction between potassium cyanide and ethanal.

_____

(1)

(b) The 2-hydroxypropanenitrile formed by the reaction in part **(a)** is a mixture of equal amounts of two isomers.

State the name of this type of mixture.

Explain how the structure of ethanal leads to the formation of two isomers.

Draw 3D representations of the two isomers to show the relationship between them.

Name _____

Explanation _____

_____

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_____

3D representations

(5)

(c) 2-Hydroxypropanenitrile can be used in the synthesis of the monomer, acrylonitrile, CH_2=CHCN

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Suggest a suitable reagent and conditions for the conversion of 2-hydroxypropanenitrile into acrylonitrile.

Reagent _____

Conditions _____

(2)

(d) Draw a section of the polymer polyacrylonitrile, showing three repeating units.

(1)

(Total 9 marks)

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Q2.

The oxidation of propan-1-ol can form propanal and propanoic acid.
The boiling points of these compounds are shown in the table.

Compound	Boiling point / °C
propan-1-ol	97
propanal	49
propanoic acid	141

In a preparation of propanal, propan-1-ol is added dropwise to the oxidising agent and the aldehyde is separated from the reaction mixture by distillation.

(a) Explain, with reference to intermolecular forces, why distillation allows propanal to be separated from the other organic compounds in this reaction mixture.

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(3)

(b) Give **two** ways of maximising the yield of propanal obtained by distillation of the reaction mixture.

1. _____

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2. _____

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(2)

(c) Describe how you would carry out a simple test-tube reaction to confirm that the sample of propanal obtained by distillation does **not** contain any propanoic acid.

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(2)

(d) A student carried out an experiment to determine the enthalpy of combustion of ethanol. Combustion of 457 mg of ethanol increased the temperature of 150 g of water from 25.1 °C to 40.2 °C

Calculate a value, in kJ mol^{-1}, for the enthalpy of combustion of ethanol in this experiment. Give your answer to the appropriate number of significant figures.

(The specific heat capacity of water is 4.18 J K^{-1} g^{-1})

Enthalpy of combustion _____ kJ mol^{-1}

(3)

(e) A mixture of isomeric alkenes is produced when pentan-2-ol is dehydrated in the presence of hot concentrated sulfuric acid. Pent-1-ene is one of the isomers produced.

Name and outline a mechanism for the reaction producing pent-1-ene.

Name of mechanism _____

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Mechanism

(4)

(f) A pair of stereoisomers is also formed in the reaction in **part (e)**.

Name the less polar stereoisomer formed.
Explain how this type of stereoisomerism arises.

Name _____

Explanation _____

_____

_____

_____

(2)

(Total 16 marks)

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