

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

Name of the Student: _____

Max. Marks :19 Marks

Time :19 Minutes

Q1.

The aldehyde $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$ reacts with KCN followed by dilute acid to form a racemic mixture of the two stereoisomers of $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}(\text{OH})\text{CN}$

- (a) Give the IUPAC name of $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}(\text{OH})\text{CN}$

(1)

- (b) Describe how you would distinguish between separate samples of the two stereoisomers of $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}(\text{OH})\text{CN}$

(2)

- (c) Explain why the reaction produces a racemic mixture.

(3)

- (d) An isomer of $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$ reacts with KCN followed by dilute acid to form a compound that does not show stereoisomerism.

Draw the structure of the compound formed and justify why it does not show stereoisomerism.

Structure

Justification

(2)
(Total 8 marks)

Q2.

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 _____

3D representations

(5)

- (c) 2-Hydroxypropanenitrile can be used in the synthesis of the monomer, acrylonitrile, $\text{CH}_2=\text{CHCN}$

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

Reagent _____

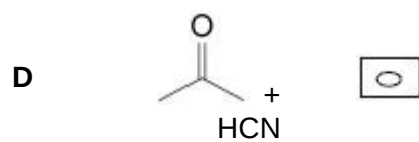
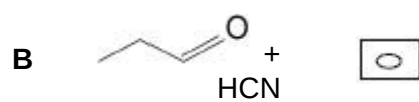
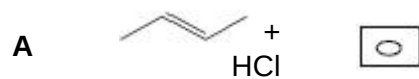
Conditions _____

(2)

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

Q3.

Which pair of compounds does **not** form a racemic mixture when the compounds react?



(Total 1 mark)

Q4.

Which compound does **not** show stereoisomerism?

A 1,2-dichloropropene ☐

B 1,2-dichloropropane ☐

C 1,3-dichloropropene ☐

D 1,3-dichloropropane ☐

(Total 1 mark)