

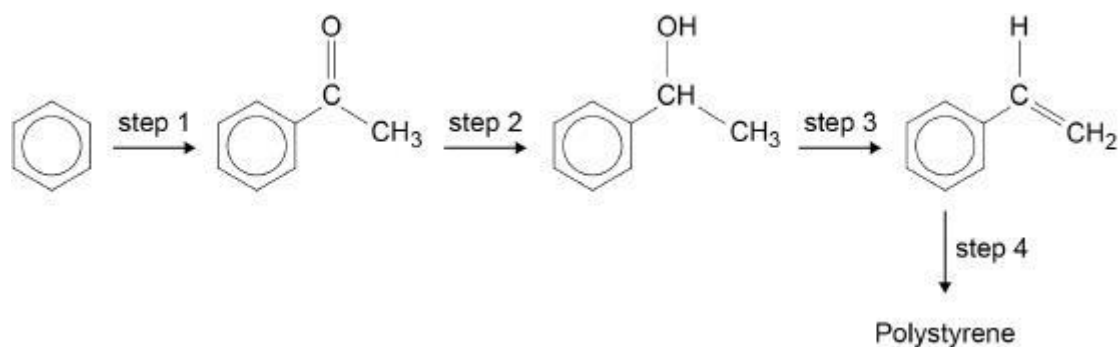
Name of the Student: _____

Max. Marks :23 Marks

Time :23 Minutes

Q1.

Polystyrene can be made from benzene in the series of steps shown.



(a) State the type of reaction in step 1.

Identify the reagent(s) and conditions needed for step 1.

Type of reaction _____

Reagent(s) _____

Conditions _____

(3)

(b) State the name of the mechanism for the reaction in step 2.

Identify the inorganic reagent needed for step 2.

Name the organic product of step 2.

Name of mechanism _____

Inorganic reagent _____

Name of organic product _____

(3)

(c) The organic product of step 2 is reacted with concentrated sulfuric acid in step 3.

Outline the mechanism for step 3.

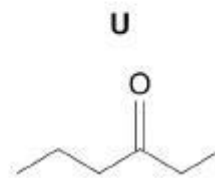
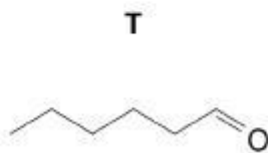
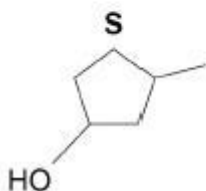
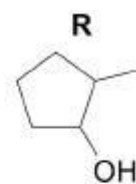
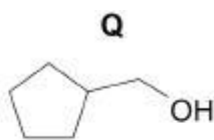
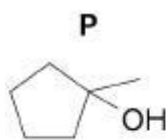
(d) Draw the repeating unit of polystyrene.

(1)

(Total 10 marks)

Q2.

This question is about the structural isomers shown.



- (a) Identify the isomer(s) that would react when warmed with acidified potassium dichromate(VI).

State the expected observation when acidified potassium dichromate(VI) reacts.

Isomer(s) _____

Expected observation _____

(2)

- (b) Identify the isomer(s) that would react with Tollens' reagent.

State the expected observation when Tollens' reagent reacts.

Isomer(s) _____

Expected observation _____

(2)

- (c) Separate samples of each isomer are warmed with ethanoic acid and a few drops of concentrated sulfuric acid. In each case the mixture is then poured into a solution of sodium hydrogencarbonate.

Identify the isomer(s) that would react with ethanoic acid.

Suggest a simple way to detect if the ethanoic acid reacts with each isomer.

Give a reason why the mixture is poured into sodium hydrogencarbonate solution.

Isomer(s) _____

Suggestion _____

Reason _____

(3)

- (d) State the type of structural isomerism shown by isomers **P**, **Q**, **R** and **S**.

(1)

- (e) Describe fully how infrared spectra can be used to distinguish between isomers **R**, **S** and **T**. Use data from **Table A** in the Data Booklet in your answer.

(4)

- (f) State why mass spectrometry using electrospray ionisation is **not** a suitable method to distinguish between the isomers.

(1)

(Total 13 marks)