

Name of the Student: _____

Max. Marks : 23 Marks

Time : 23 Minutes

Q1.

Terylene is made by reacting benzene-1,4-dicarboxylic acid and ethane-1,2-diol.

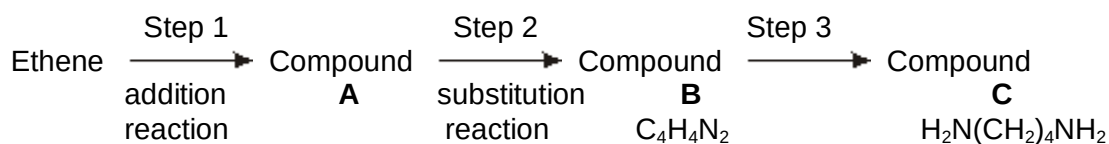
Terylene is

- A** an addition polymer.
- B** a polyamide.
- C** a polyester.
- D** a nylon.

(Total 1 mark)

Q2.

- (a) Compound **C**, $\text{H}_2\text{N}(\text{CH}_2)_4\text{NH}_2$, can be synthesised from ethene in three steps as shown below.



Name compound **C** and draw a structure for each of compounds **A** and **B**.

State the reagent(s) required for each step and name the type of reaction involved in the conversion of **B** into **C**.

(7)

- (b) Draw the repeating unit of the polyamide formed when **C** reacts with hexanedioic acid. Discuss the interactions between the chains of the polyamide.

(4)

- (c) Explain why polyamides are degraded by sodium hydroxide whereas polymers such as poly(ethene) are not.

(3)

(Total 14 marks)

Q3.

- (a) Synthetic polyamides are produced by the reaction of dicarboxylic acids with compounds such as $\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2$

(i) Name the compound $\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2$

(ii) Give the repeating unit in the polyamide nylon 6,6.

(2)

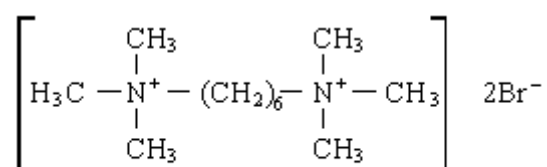
- (b) Synthetic polyamides have structures similar to those found in proteins.

(i) Draw the structure of 2-aminopropanoic acid.

(ii) Draw the organic product formed by the condensation of two molecules of 2-aminopropanoic acid.

(2)

- (c) Compounds like $\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2$ are also used to make ionic compounds such as **X**, shown below.



Compound **X**

- (i) **X** belongs to the same type of compound as $(\text{CH}_3)_4\text{N}^+\text{Br}^-$
Name this **type** of compound.

- (ii) State a reagent which could produce **X** from $\text{H}_2\text{N}(\text{CH}_2)_6\text{NH}_2$ and give a necessary condition to ensure that **X** is the major product.

Reagent _____

Condition _____

(iii) Name the mechanism involved in this reaction to form **X**.

(4)

(Total 8 marks)