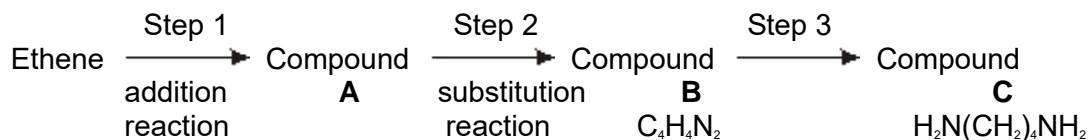


Q1.(a) Compound **C**, $\text{H}_2\text{N}(\text{CH}_2)_4\text{NH}_2$, can be synthesised from ethene in three steps as shown below.



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)

Q2. (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)

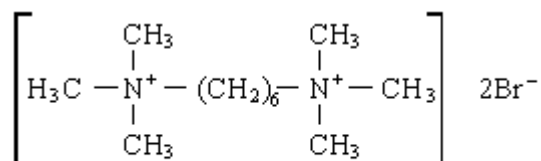
(b) Synthetic polyamides have structures similar to those found in proteins.

(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)