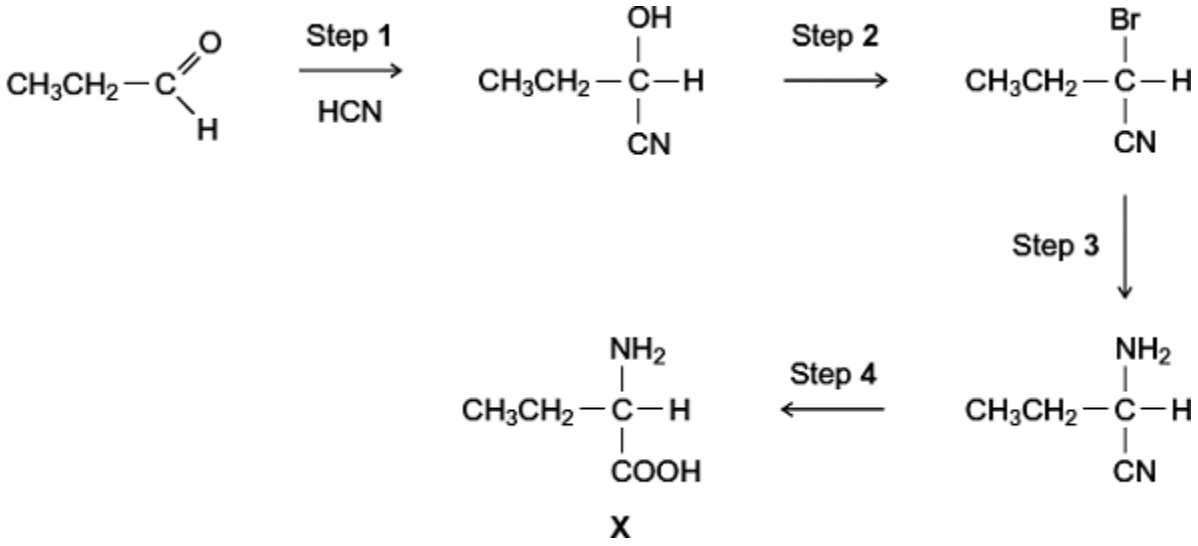
Practice Question Set For A-Level
Subject : Chemistry
Paper-2 Topic: AminoAcids, Proteins & DNA

Merit Minds
www.merit-minds.com
Exam Preparation and Free Resources

Name of the Student:_____
Max. Marks : 29 Marks **Time : 29 Minutes**

Q1.

A possible synthesis of the amino acid **X** is shown below.



(a) Name and outline a mechanism for Step **1**.

Name of mechanism _____

Mechanism

(5)

(b) Give the IUPAC name of the product of Step **2**.

_____

(1)

(c) For Step **3**, give the reagent, give a necessary condition and name the mechanism.

Reagent _____

Condition _____

Name of mechanism _____

Downloaded from www.merit-minds.com

(3)

(d) At room temperature, the amino acid **X** exists as a solid.

(i) Draw the structure of the species present in the solid amino acid.

(1)

(ii) With reference to your answer to part (d)(i), explain why the melting point of the amino acid **X** is higher than the melting point of $CH_3CH_2CH(OH)COOH$.

_____

_____

_____

_____

_____

(2)

(e) There are many structural isomers of **X**, $CH_3CH_2CH(NH_2)COOH$.

(i) Draw a structural isomer of **X** that is an ethyl ester.

(1)

(ii) Draw a structural isomer of **X** that is an amide and also a tertiary alcohol.

(1)

(iii) Draw a structural isomer of **X** that has an unbranched carbon chain and can be polymerised to form a polyamide.

(1)

(f) Draw the structure of the tertiary amine formed when **X** reacts with bromomethane.

(1)

(Total 16 marks)

Downloaded from www.merit-minds.com

Q2.

(a) Name compound **Y**, $HOCH_2CH_2COOH$

_____

(1)

(b) Under suitable conditions, molecules of **Y** can react with each other to form a polymer.

(i) Draw a section of the polymer showing **two** repeating units.

(1)

(ii) Name the type of polymerisation involved.

_____

(1)

(c) When **Y** is heated, an elimination reaction occurs in which one molecule of **Y** loses one molecule of water. The organic product formed by this reaction has an absorption at 1637 cm^{-1} in its infrared spectrum.

(i) Identify the bond that causes the absorption at 1637 cm^{-1} in its infrared spectrum.

_____

(1)

(ii) Write the displayed formula for the organic product of this elimination reaction.

(1)

(iii) The organic product from part (ii) can also be polymerised.
Draw the repeating unit of the polymer formed from this organic product.

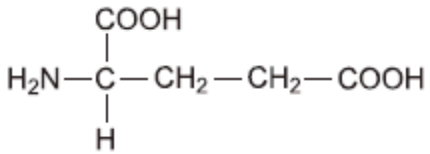
(1)

(d) At room temperature, 2-aminobutanoic acid exists as a solid.
Draw the structure of the species present in the solid form.

Downloaded from www.merit-minds.com

(1)

(e) The amino acid, glutamic acid, is shown below.



Draw the structure of the organic species formed when glutamic acid reacts with each of the following.

(i) an excess of sodium hydroxide

(1)

(ii) an excess of methanol in the presence of concentrated sulfuric acid

(1)

(iii) ethanoyl chloride

(1)

(f) A tripeptide was heated with hydrochloric acid and a mixture of amino acids was formed. This mixture was separated by column chromatography.
Outline briefly why chromatography is able to separate a mixture of compounds.
Practical details are **not** required.

_____

_____

_____

_____

Downloaded from www.merit-minds.com

_____

_____

(3)

(Total 13 marks)

Downloaded from www.merit-minds.com