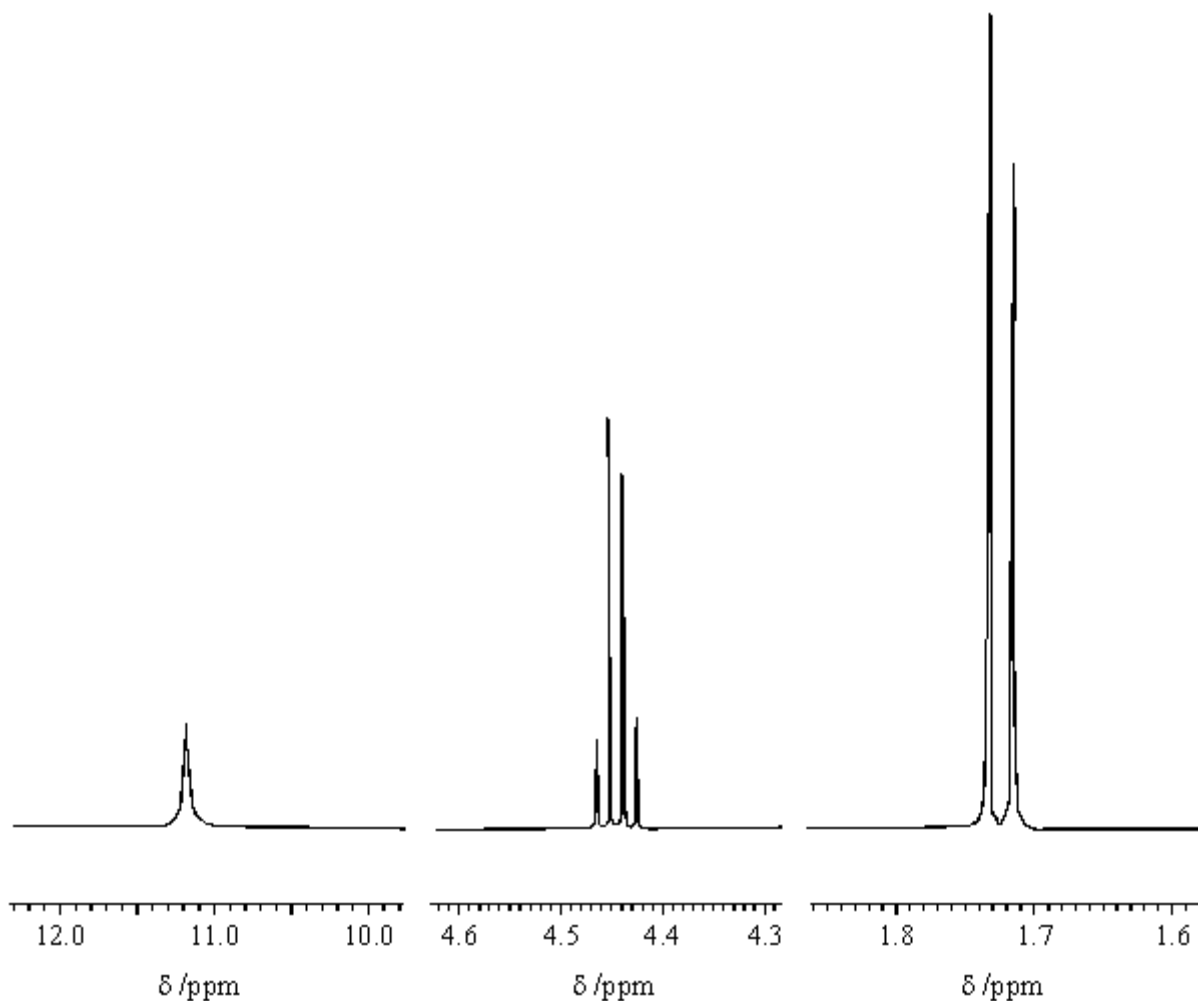


Name of the Student: _____

Max. Marks : 21 Marks

Time : 21 Minutes

Q1.

Three sections of the proton n.m.r. spectrum of $\text{CH}_3\text{CHClCOOH}$ are shown below.(a) Name the compound $\text{CH}_3\text{CHClCOOH}$

(1)

(b) Explain the splitting patterns in the peaks at δ 1.72 and δ 4.44

(2)

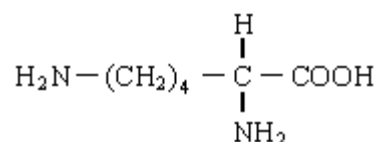
- (c) Predict the splitting pattern that would be seen in the proton n.m.r. spectrum of the isomeric compound $\text{ClCH}_2\text{CH}_2\text{COOH}$

(1)

- (d) The amino acid *alanine* is formed by the reaction of $\text{CH}_3\text{CHClCOOH}$ with an excess of ammonia. The mechanism is nucleophilic substitution. Outline this mechanism, showing clearly the structure of *alanine*.

(5)

- (e) The amino acid *lysine* has the structure



Draw structures to show the product formed in each case when lysine reacts with

- (i) an excess of aqueous HCl ,

- (ii) an excess of aqueous NaOH ,

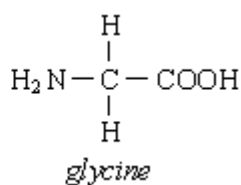
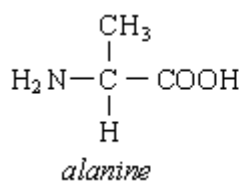
- (iii) another molecule of lysine.

(3)

(Total 12 marks)

Q2.

The structures of the amino acids *alanine* and *glycine* are shown below.



- (a) Give the systematic name for *alanine*.

(1)

- (b) *Alanine* exists as a pair of stereoisomers.

- (i) Explain the meaning of the term *stereoisomers*.

- (ii) State how you could distinguish between the stereoisomers.

(4)

- (c) Give the structural formula of the species formed by *glycine* at pH 14.

(1)

- (d) When two amino acids react together, a dipeptide is formed. Give the structural formulae of the **two** dipeptides which are formed when *alanine* and *glycine* react together.

Dipeptide 1

Dipeptide 2

(2)

- (e) Give the structural formula of the organic compound formed when *glycine* reacts with methanol in the presence of a small amount of concentrated sulphuric acid.

(1)

(Total 9 marks)