

# CfE Higher Chemistry Homework

## Unit 2: Nature's Chemistry

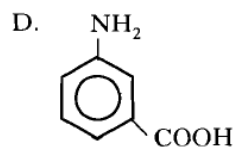
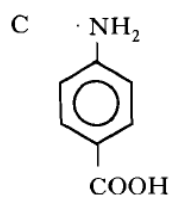
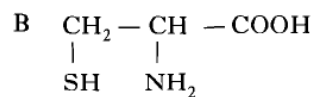
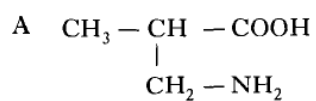
### Proteins

1. Proteins can be classified as

- Polyesters
- Amino acids
- Polyamides
- Carboxylic Acids

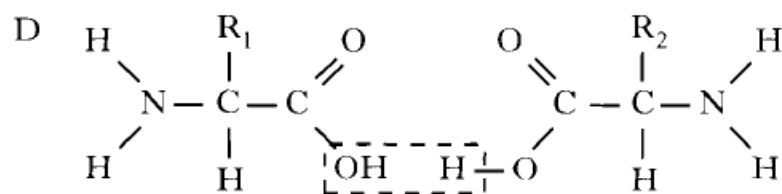
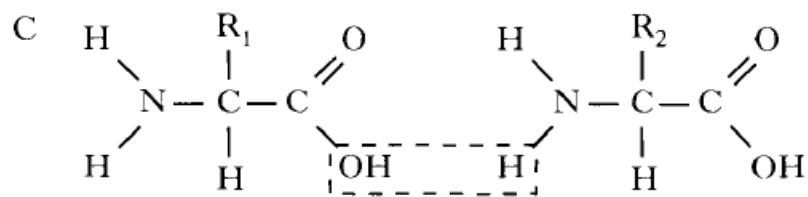
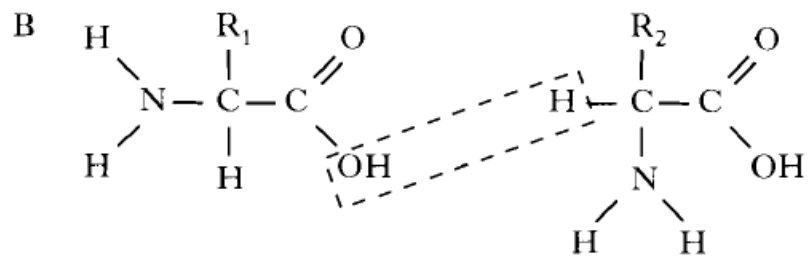
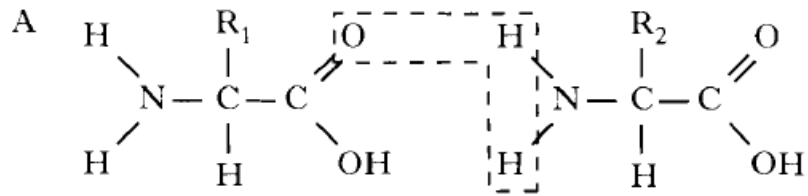
2. In alpha amino acids the amino group is on the carbon atom adjacent to the acid group.

Which of the following is an alpha-amino acid?



3. When two amino acids condense together, water is removed and an amide link is formed.

Which of the following represents the process?



4. Proteins are denatured under acidic conditions.

During this denaturing, the protein molecule

- Changes shape
- Is dehydrated
- Is neutralised
- Is polymerised

5. The arrangement of amino acids in a peptide is



Where the letters V, W, X, Y and Z represent amino acids. On partial hydrolysis of the peptide, which of the following sets of dipeptides is possible?

- a. V-Y, Z-X, W-Y, X-W
- b. Z-X, V-Y, W-V, X-W
- c. Z-X, X-V, W-V, V-Y
- d. X-W, X-Z, Z-W, Y-V

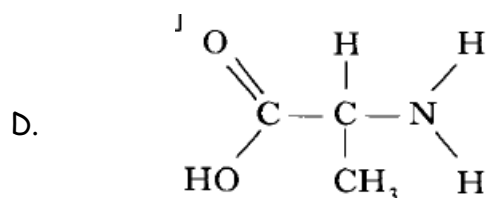
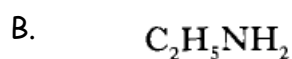
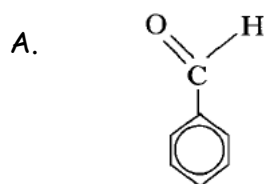
6. The monomer units used to construct enzyme molecules are

- a. Alcohols
- b. Esters
- c. Amino acids
- d. Fatty acids

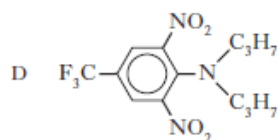
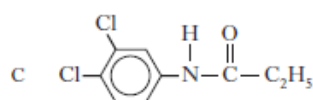
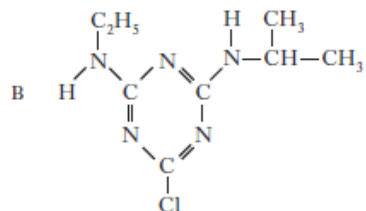
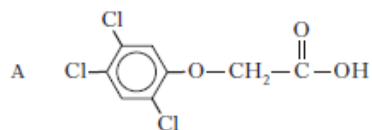
7. Amino acids are converted into proteins by

- a. Hydration
- b. Hydrolysis
- c. Hydrogenation
- d. Condensation

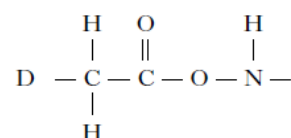
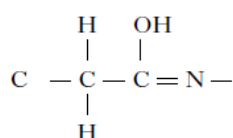
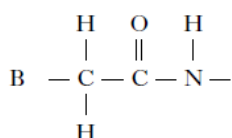
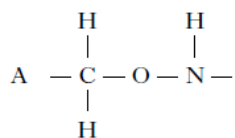
8. Identify the molecule which could be produced when a protein is hydrolysed



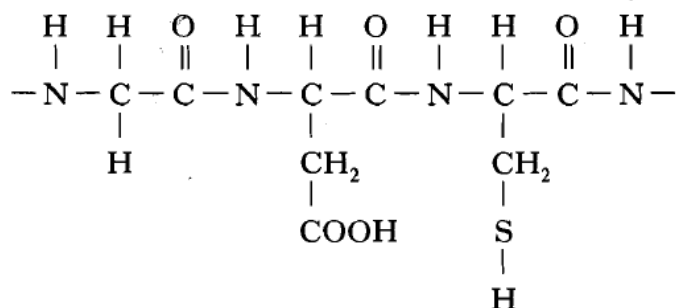
9. The following molecules are found in herbicides  
Which of the following contain an amide link



10. Which of the following is an amine?



11. Part of a protein molecule is shown below. Draw the structural formula for one of the monomers produced on hydrolysis of the protein. (2)



12. Keratin, a natural polymer, is a protein found in hair. The hydrolysis of keratin produces different compounds
- What name is given to compounds like glycine, alanine and cysteine?
  - What is meant by a hydrolysis reaction?
  - Proteins are polyamides, what name is given to the link in a polyamide?
  - Draw the link present in a polyamide (4)
13. Explain what is meant by the term essential amino acid (2)
14. There are many different enzymes in the human body.  
Which four elements do all enzymes contain? (1)
15. Salivary amylase is an enzyme found in the human body which converts starch to maltose. The pH of saliva is about 7, which is close to the optimum temperature of an enzyme. Amylase stops functioning when it enters the stomach which has a pH of 2.  
What happens to the enzyme on entering the stomach which would cause it to stop functioning? (1)
16. Paracetamol is a widely used painkiller. The structure is shown below.  
Identify the 2 functional groups present in this molecule.

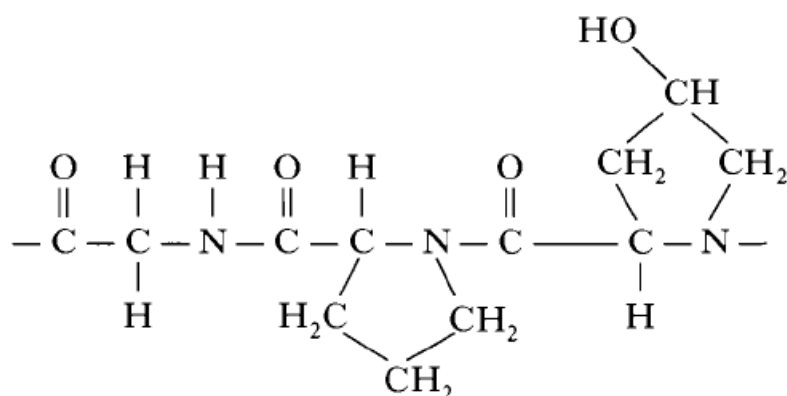


(2)

17. Vitamin C is required by our bodies for producing the protein, collagen. The structure of collagen is formed from the protein bonding to form sheets that support skin and internal organs.

a. Name the type of bonding which occurs between protein molecules? (1)

b. Part of the structure of collagen is shown below. Draw a structural formula for an amino acid which could be obtained by hydrolysing this part of collagen.

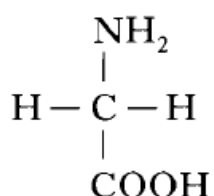


(2)

18. Electrophoresis, widely used in medicine and forensics, involves the movement of ions in an electric field. The technique can be used to separate and identify amino acids produced by the breakdown of proteins.

a. Name the type of chemical reaction which takes place during the breakdown of proteins. (1)

b. The amino acid glycine has the following structure



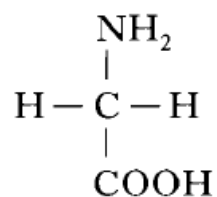
Draw 3 glycine molecules joined together.

(1)

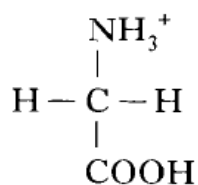
c. The creation of proteins is an example of which type of chemical reaction?

(1)

d. The amino acid glycine has the following structure



19. Like all amino acids, glycine exists as ions in solution and the charge on the ion depends on the pH of the solution. In solutions with low pH the glycine exists as a positively charged ion:



In solutions with a high pH value the glycine exists as a negatively charged ion?

Draw the structure of the negative ion.

(1)