



**CHEMISTRY ONLINE**  
— **TUITION** —

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# CHEMISTRY

## INORGANIC CHEMISTRY II

Level & Board

AQA (A-LEVEL)

TOPIC:

AMINO ACIDS, PROTEIN AND DNA

PAPER TYPE:

QUESTION PAPER - 1

TOTAL QUESTIONS

10

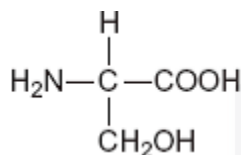
TOTAL MARKS

31

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## Amino Acids, Protein and DNA

1. Consider the amino acid serine.



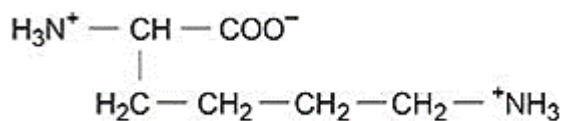
(a) Draw the structure of the product formed when serine reacts with an excess of  $\text{CH}_3\text{Br}$

(1)

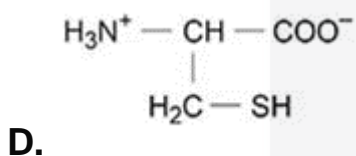
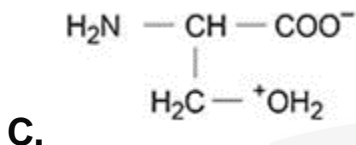
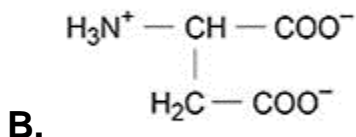
(b) Draw the structure of the dipeptide formed by two molecules of serine.

(1)

2. Which is the structure of a zwitterion of an amino acid?



A.



(1)

3. Leucine (2-amino-4-methylpentanoic acid) is a naturally occurring  $\alpha$ -amino acid that is often used in protein supplements.

Leucine has a structural formula of  $(\text{CH}_3)_2\text{CHCH}_2\text{CH}(\text{NH}_2)\text{COOH}$ .

(a) State the general formula of an  $\alpha$ -amino acid.

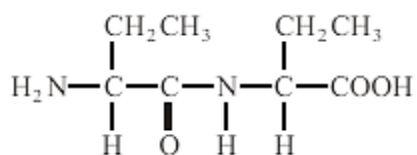
(1)

(b) Draw a displayed formula of leucine.

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(1)

4. When the dipeptide shown below is heated under acidic conditions, a single amino acid is produced.



I am Sorry !!!!!

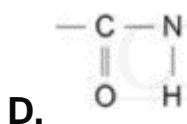
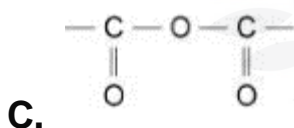
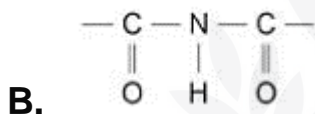
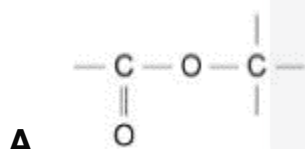
(a) Name this amino acid.

(1)

(b) Draw the structure of the amino acid species present in the acidic solution.

(1)

5. Which structure shows part of a peptide link in a protein?



(1)

6. Kevlar is a very tough polymer made from 1,4-diaminobenzene and benzene-1,4-dicarboxylic acid.

(a) State a use for Kevlar.

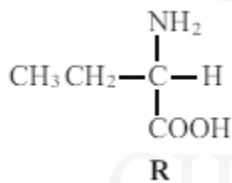
(1)

**(b)** Describe the polymerisation reaction that forms Kevlar.  
Include in your answer:

- an explanation of the type of polymerisation involved
- an equation for the reaction
- a repeat unit to show the structure of Kevlar.

(5)

7. The amino acid R is shown below.



**(a)** Draw the structure of the zwitterion formed by R. \_\_\_\_\_

(1)

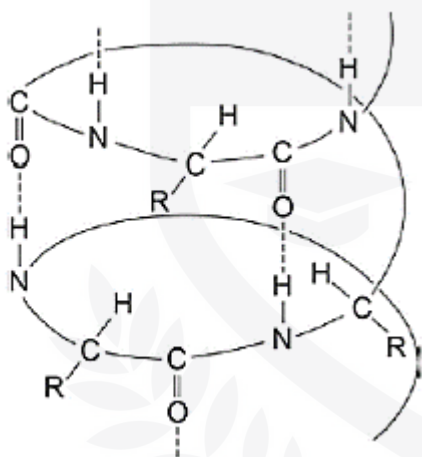
**(b)** Draw the structure of the major organic product formed when an excess of R is reacted with bromomethane.

(1)

(c) Name the mechanism of the reaction which results in the formation of the product.

(1)

8. The following figure shows a simplified representation of the arrangement of some amino acids in a portion of a protein structure in the form of an  $\alpha$ -helix.



(a) Name the type of protein structure in the figure.

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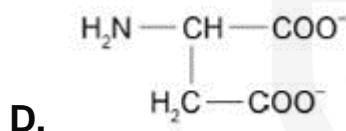
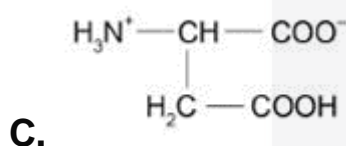
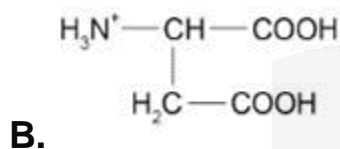
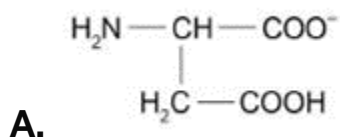
(1)

(b) Explain the origin of the interaction represented by the dotted lines in the figure above.

I am Sorry !!!!!

(4)

9. Which structure is formed by aspartic acid in solution at pH 12?



(1)

10. Leucine (2-amino-4-methylpentanoic acid) is a naturally occurring  $\alpha$ -amino acid that is often used in protein supplements.

Leucine has a structural formula of  $(\text{CH}_3)_2\text{CHCH}_2\text{CH}(\text{NH}_2)\text{COOH}$ .  
Leucine can be obtained from a source of protein such as meat.

(a) State suitable reagents and conditions to break down a protein into amino acids.

(2)

(b) State the type of reaction occurring.



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