

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**Advanced GCE**

**CHEMISTRY**

Biochemistry

**2815/02**

Tuesday

**25 JUNE 2002**

Morning

50 minutes

Candidates answer on the question paper.

Additional materials:

*Data Sheet for Chemistry*

Scientific calculator

Candidate Name	Centre Number	Candidate Number											
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**TIME** 50 minutes

**INSTRUCTIONS TO CANDIDATES**

- Write your name in the space above.
- Write your Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers in the spaces on the question paper.
- Read each question carefully and make sure you know what you have to do before starting your answer.

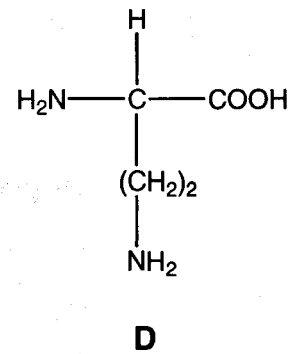
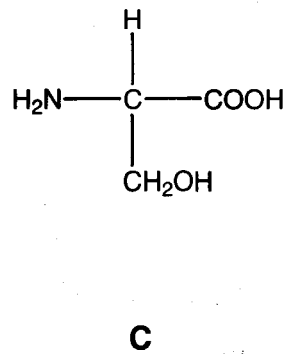
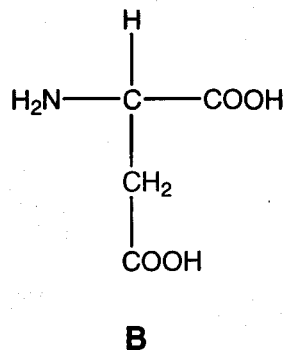
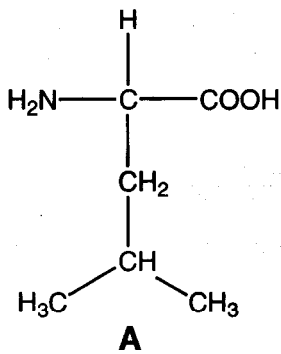
**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use a scientific calculator.
- You may use the *Data Sheet for Chemistry*.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	11	
2	7	
3	9	
4	8	
5	10	
<b>TOTAL</b>	<b>45</b>	

**This question paper consists of 8 printed pages.**

1 The structures of four amino acids may be represented as shown below.



(a) (i) Which functional groups are involved when a peptide chain forms from amino acids?

.....[1]

(ii) Draw a diagram to show how these groups are linked in the peptide chain.

[1]

(b) Draw the structure of compound D at pH 12.

[2]

- (c) Which sidechains in the examples A to D, are most likely to be involved in the denaturation of proteins by
- changes in pH
  - addition of heavy metal ions?

Explain your answer.

*(In this question, 1 mark is available for the quality of written communication.)*

.....

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.....

.....

.....

.....[6]  
Quality of Written Communication [1]  
[Total : 11]

2 (a) Enzymes are highly active and specific catalysts.

(i) How does a catalyst speed up a reaction?

.....  
.....[1]

(ii) Why is enzyme catalysis specific?

.....  
.....[2]

(b) (i) Enzymes may be immobilised by, for example, trapping them in beads of a gel.

State **two** advantages and **one** disadvantage of using immobilised enzymes.

Advantages:

.....  
.....  
.....

Disadvantage:

.....  
.....  
.....

[3]

(ii) State **one** example of the commercial use of an immobilised enzyme.

.....[1]

[Total : 7]

- 3 Fig.3.1. shows an incomplete structure of  $\beta$ -D-glucose.

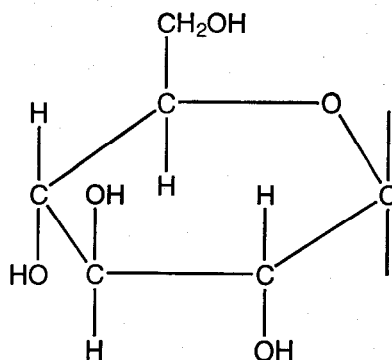


Fig 3.1

- (a) Complete Fig.3.1. [2]

- (b) Draw a structure of D-glucose in open chain form.

[2]

- (c) Glucose is more soluble in water than cyclohexanol.

- (i) Explain, with the aid of a diagram, why glucose is soluble in water.

[2]

- (ii) Suggest why glucose is more soluble than cyclohexanol in water.

.....  
 .....  
 ..... [2]

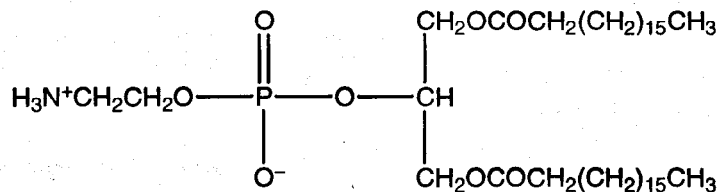
- (d) Suggest **one** reason why carbohydrate is stored as a polymer rather than a monomer.

.....  
 ..... [1]

[Total : 9]

[Turn over

- 4 A phosphoglyceride is one type of lipid. The diagram shows the structure of a phosphoglyceride.



- (a) (i) Redraw a  $-\text{CH}_2\text{OCOCH}_2-$  section of the molecule to show every bond.

[1]

- (ii) Name the functional group present in  $-\text{CH}_2\text{OCOCH}_2-$ .

.....[1]

- (b) Describe, with a diagram, how phosphoglycerides are involved in the formation of cell membranes.

[4]

- (c) Another function of lipids is as a concentrated energy store. Explain why lipids can release about twice as much energy per gram as carbohydrates on complete oxidation.

.....  
 .....  
 .....  
 .....  
 .....[2]

[Total : 8]

5 The sequence of bases in a small section of a single strand of DNA is shown below.

-CGTCAT-

(a) (i) Write down the base sequence in the complementary strand of this section of DNA.

.....[1]

(ii) Write down the RNA sequence that would be obtained by the transcription of the DNA section which you have written in part (i).

.....[1]

(b) State **three** differences between the structures of DNA and RNA.

.....  
.....  
.....  
.....[3]

(c) Explain how RNA molecules are involved in the formation of proteins by translation. Diagrams may be helpful.

[5]

[Total : 10]