

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS****Advanced GCE****CHEMISTRY****2815/02**

Biochemistry

Friday

**23 JANUARY 2004**

Afternoon

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 provided 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.

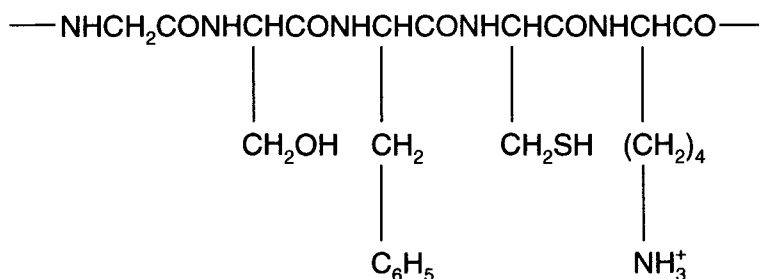
<b>FOR EXAMINER'S USE</b>		
Qu.	Max.	Mark
1	7	
2	12	
3	13	
4	13	
<b>TOTAL</b>	<b>45</b>	

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**This question paper consists of 11 printed pages and 1 blank page.**

Answer **all** the questions.

- 1 This question is about part of a polypeptide, shown below.



- (a) How many amino acids are linked in this fragment?

.....[1]

- (b) The polypeptide can be split into smaller fragments by hydrolysis using enzymes.

- (i) Name one type of enzyme that could be used.

.....[1]

- (ii) Why are enzymes like this used in some washing powders?

.....

.....[1]

- (iii) Write the structure, at pH 1, for the right hand amino acid after hydrolysis.

[1]

(c) In silk, the peptide chains are arranged in  $\beta$ -pleated sheets.

(i) Use a simple diagram to show how peptide chains can be arranged in  $\beta$ -pleated sheets.

[1]

(ii) Describe the interactions between the peptide chains in a  $\beta$ -pleated sheet.

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

[Total: 7]

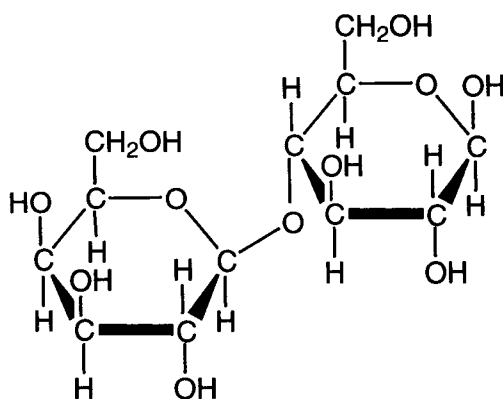


.....[11]

Quality of Written Communication [1]

[Total: 12]

- 3 D-Lactose is a disaccharide found in milk. Its structure is shown below.



**D-lactose**

- (a) D-Lactose can be hydrolysed to form two monosaccharides.

- (i) Write structures, in ring form, of the two monosaccharides formed. Label **one** of your structures with its name.

[3]

- (ii) Write a balanced equation for the hydrolysis of D-lactose,  $C_{12}H_{22}O_{11}$ .

.....[1]

(b) The hydrolysis reaction in (a)(ii) is very slow in aqueous solution at room temperature. State **two** ways of increasing the rate of hydrolysis by catalysis.

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

(c) Suggest why lactose is soluble in water.

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

(d) The complete oxidation of a carbohydrate like lactose releases less energy per gram than a triglyceride. Explain this difference in terms of the bond breaking and bond making involved.

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

(e) Triolein, the triglyceride found in olive oil, has the molecular formula  $C_{57}H_{104}O_6$ . When some triolein is hydrolysed with an enzyme, only two compounds are formed. Calculate the molecular formulae of these **two** compounds.

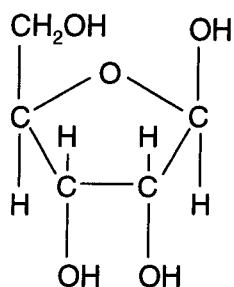
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[Total: 13]

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- 4 The cyclic structure of ribose is shown below.



- (a) (i) What is the molecular formula of ribose?

.....[1]

- (ii) Suggest a straight chain structure for ribose.

- (iii) Name **two** different functional groups shown in your structure in (ii).

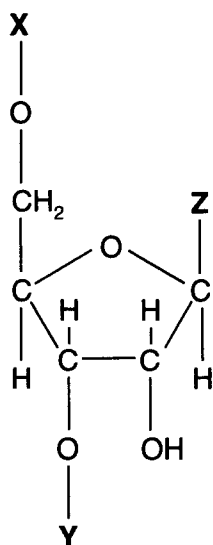
[2]

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

- (iv) State clearly how the structure of deoxyribose differs from that of ribose.

.....[1]

(b) The diagram shows a ribose residue in the middle of a strand of t-RNA.



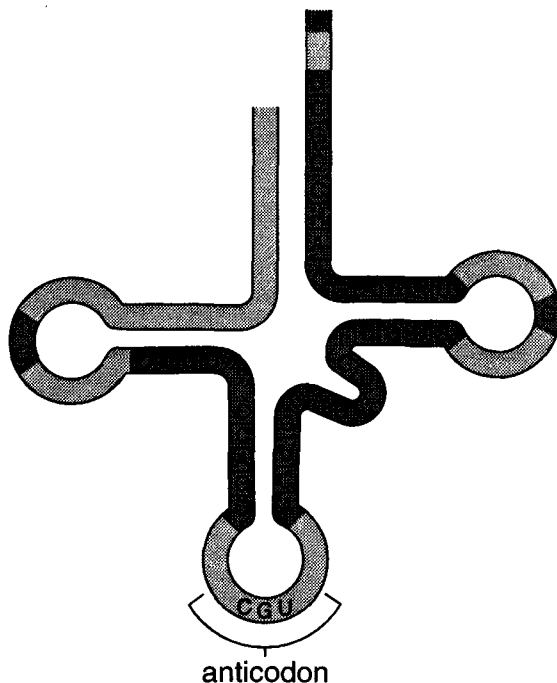
Write down the atoms represented by X .....

Y .....

Z .....

[3]

(c) The diagram shows a t-RNA molecule with the triplet of bases (anticodon) that will bind to m-RNA.



(i) Name the base represented by the letter C.

.....[1]

(ii) Write down the sequence of the base triplet on m-RNA to which this t-RNA molecule would bind.

.....[1]

(iii) How are the two base triplets attracted to each other?

.....[1]

(iv) Why are there many different t-RNA molecules in cells?

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

[Total: 13]