

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

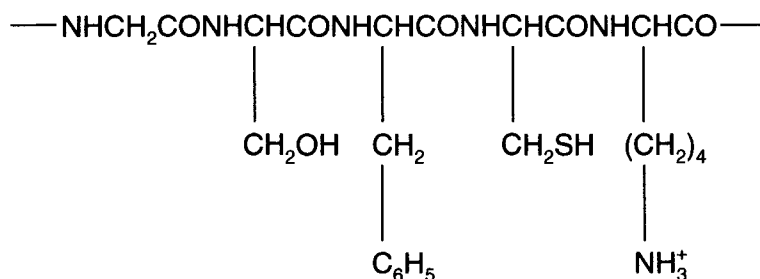
- The number of marks is given in brackets [] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use a scientific calculator.
- You may use the *Data Sheet for Chemistry*.
- You are advised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

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

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 β -pleated sheets.

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

[1]

(ii) Describe the interactions between the peptide chains in a β -pleated sheet.

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

[Total: 7]

2 In this question, one mark is available for the quality of written communication.

Describe, and explain, the ways in which enzymes may be inhibited and denatured. You may find it helpful to use diagrams to illustrate your answer.

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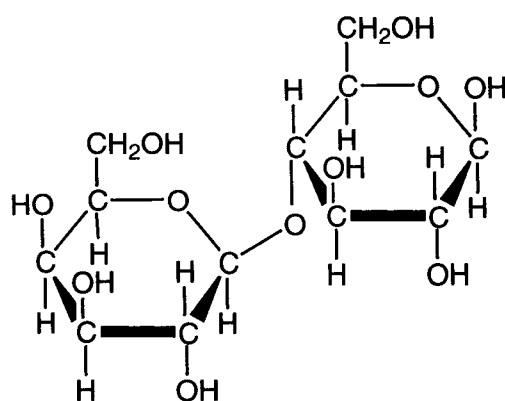
.....

.....[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.

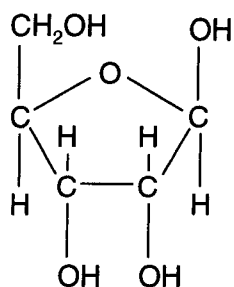
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.....[3]

(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.

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

[Total: 13]

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).

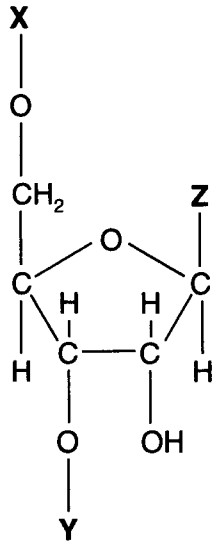
[2]

.....
.....[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.



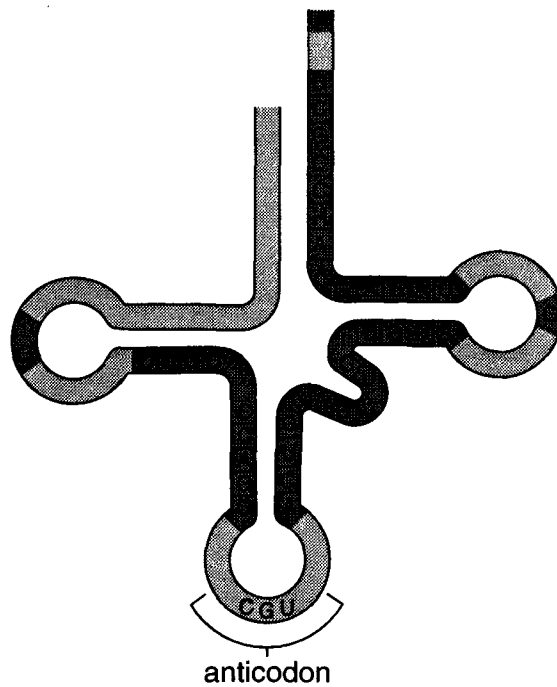
Write down the atoms represented by X

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]