

Post stand 2/02/05
Subject: ...BIOCHEMISTRY
.....Code:2815/02.....

Session: January ... Year: 2005.....

Mark Scheme

MAXIMUM MARK	45
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ADVICE TO EXAMINERS ON THE ANNOTATION OF SCRIPTS

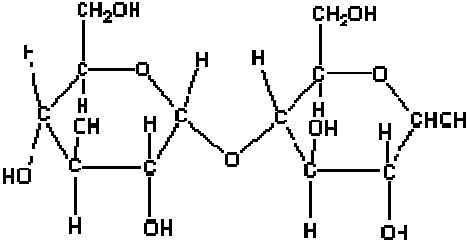
1. Please ensure that you use the **final** version of the Mark Scheme.
You are advised to destroy all draft versions.
2. Please mark all post-standardisation scripts in red ink. A tick (✓) should be used for each answer judged worthy of a mark. Ticks should be placed as close as possible to the point in the answer where the mark has been awarded. The number of ticks should be the same as the number of marks awarded. If two (or more) responses are required for one mark, use only one tick. Half marks ($\frac{1}{2}$) should never be used.
3. The following annotations may be used when marking. No comments should be written on scripts unless they relate directly to the mark scheme. Remember that scripts may be returned to Centres.
 - x = incorrect response (errors may also be underlined)
 - ^ = omission mark
 - bod = benefit of the doubt (where professional judgement has been used)
 - ecf = error carried forward (in consequential marking)
 - con = contradiction (in cases where candidates contradict themselves in the same response)
 - sf = error in the number of significant figures
4. The marks awarded for each part question should be indicated in the margin provided on the right hand side of the page. The mark total for each question should be ringed at the end of the question, on the right hand side. These totals should be added up to give the final total on the front of the paper.
5. In cases where candidates are required to give a specific number of answers, (e.g. 'give three reasons'), mark the first answer(s) given up to the total number required. Strike through the remainder. In specific cases where this rule cannot be applied, the exact procedure to be used is given in the mark scheme.
6. Correct answers to calculations should gain full credit even if no working is shown, unless otherwise indicated in the mark scheme. (An instruction on the paper to 'Show your working' is to help candidates, who may then gain partial credit even if their final answer is not correct.)
7. Strike through all blank spaces and/or pages in order to give a clear indication that the whole of the script has been considered.
8. An element of professional judgement is required in the marking of any written paper, and candidates may not use the exact words that appear in the mark scheme. If the science is correct and answers the question, then the mark(s) should normally be credited. If you are in doubt about the validity of any answer, contact your Team Leader/Principal Examiner for guidance.

Mark Scheme	Unit Code	Session	Year	Version
Page 1 of				
Abbreviations, annotations and conventions used in the Mark Scheme	/ = alternative and acceptable answers for the same marking point ; = separates marking points NOT = answers which are not worthy of credit () = words which are not essential to gain credit <u> </u> = (underlining) key words which must be used to gain credit ecf = error carried forward AW = alternative wording ora = or reverse argument			
Question	Expected Answers			Marks
1.(a)(i)	All points correctly plotted ✓ Smooth curve through their points ✓ The line may stop at 40° but, if continued should descend steeply.			2
(ii)	Mark the optimum shown on their graph (about 32°) ✓. It must not be 30 or 35.			1
(iii)	Heat/thermal vibrations disrupts the tertiary structure ✓ and changes shape of enzyme/active site ✓ reducing efficiency. AW			2
(b)(i)	Any two points from ✓ ✓ • Enzyme can be used continuously/reused • Enzyme/products easily separated • End product inhibition minimised • Thermal stability of enzyme often increased but not at extreme temperature • Optimum temperature may go up leading to faster reaction			2
(ii)	Papain would catalyse the hydrolysis of gelatin, (destroying the immobilising support). AW ✓			1
(c)	Advantage: removes/dissolves protein stains ✓ Accept gelatin/jelly stains, but not pineapple. Disadvantage: cannot be used above 40°/might catalyse hydrolysis of protein fabric eg silk/possible allergic reaction ✓.			2
	Question total			10

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Question	Expected Answers			Marks
2.	<p>Look for 9 marks from the following.</p> <p>DNA is a long chain polymer with alternating deoxyribose and phosphate groups✓ (Give 1 mark for sugar-phosphate). In words or clear diagram. These are linked through the 3' and 5' carbons on the deoxyribose (or diagram) ✓ Each deoxyribose carries a base on the 1' carbon (or diagram)✓ Parallel strands of DNA are held together (in a double helix) by hydrogen bonding between complementary base pairs (specified as CG, AT)✓ and by van der Waals attraction between the (delocalised) rings on the bases✓.</p> <p>Cellulose is made from long linear chains ✓ of glucose molecules joined by 1-beta-4✓ glycosidic links . Correct diagram✓.</p> <p>Hydrogen bonding holds adjacent parallel chains✓ together - diagram showing use of appropriate hydrogen and oxygen atoms✓.</p> <p>The QWC is for correct use of the terms hydrogen bonding and glycosidic link, in context.✓</p> <p style="text-align: right;">Question total</p>			<p style="text-align: center;">9</p> <p style="text-align: center;">1</p> <p style="text-align: center;">10</p>

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3.(a)(i)	Metal atom/ion bound in porphyrin/haem-like ring structure/complex ✓			1
(ii)	Mg (instead of Fe)/ not protein/other difference ✓			1
(b)	CH₃OH or C₂₀H₃₉OH ✓			1
(c)	Four protein/polypeptide chains ✓, <u>each</u> with a haem group ✓, group together to form full protein			2
(d)	Any three marks from: Oxygen binds <u>reversibly</u> ✓ To the iron/Fe ✓ Binding occurs when partial pressure/concentration of oxygen is high in lungs ✓ Oxygen is released when partial pressure/concentration of oxygen is low in cells ✓			3
	Question total			8
Question	Expected Answers			Marks

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4.(a)(i)	_____ Two hydrocarbon/long chain fatty acid tails✓ One charged/ionic/phosphate head O ✓			2
(ii)	Van der Waals forces/instantaneous dipole induced dipole AW✓. Not hydrophobic attraction.			1
(iii)	A bimolecular layer has two phospholipid layers (tail to tail) / diagram ✓ AW✓			1
(b)(i)	Hydrolysis with hot✓ <u>aqueous</u> sodium hydroxide solution /alkali✓ (Hot alone earns no mark).			2
(ii)	$\text{C}_3\text{H}_5\text{O}_3(\text{OCC}_{17}\text{H}_{33})_3 + 3 \text{NaOH} \rightarrow \text{C}_3\text{H}_8\text{O}_3 + 3\text{C}_{17}\text{H}_{33}\text{COONa}$ Correct formula for soap ✓ and balance ✓ Using structures is acceptable. Ecf if acid is used in (i).			2
(iii)	_____ is a hydrocarbon/alkyl tail ✓ O is COO ⁻ ✓ (accept COONa etc but COOH only as ecf from (ii)). Polar head and non-polar tail /hydrophilic and hydrophobic earns 1 mark.			2
	Question total			10
Question	Expected Answers			Marks

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5.				
(a)	HOH₂CCHOHCHOHCHOHCHOHCHO Or vertically. Ignore stereochemistry ✓			1
(b)	Look for α-glycosidic link ✓ Rest of molecule ✓ 			2
(c)	Either (heat) with aq HCl ✓ Or by use of maltase ✓			1
(d)	Maltose has many hydroxyl groups ✓ available for hydrogen bonding ✓ to water. In starch many of these OH groups are tucked away inside the structure/helix ✓ and are not available.			3
	Question total			7
	PAPER TOTAL			45
Question	Expected Answers			Marks

