Mark Scheme (Results)

October 2022

Pearson Edexcel International Advanced Level In Biology (WBI13)
Paper 01 Practical Skills in Biology I

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October 2022
Publications Code WBI13_01_2210_MS

General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Additional Guidance	Mark
1(a)	An explanation that includes the following points: • because (antioxidants / vitamin C) reduce (the quantity of) free radicals (1) • that cause damage to {cells / tissues / blood vessels / endothelium} (1) • reducing {plaque / atheroma} formation (1)	Accept neutralise, get rid of, inhibit, plus many other ways of saying this Ignore ref to clots	Expert (3)

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	A description that includes the following points: • use {equal / controlled} masses of the foods (1) • use {standard / same} extraction method (1) • measure out {equal / same} volume of DCPIP solution (1) • add food extract dropwise until {no colour remains / blue to colourless} (1) • record {volume / number of drops} used (1) • explanation of how to calculate vitamin C content / description of calibration of DCPIP with known vitamin C concentration (1)	Accept stated detail e.g. volume of distilled water / time of macerating / standard filtering method measure out {equal / same} food extract Add DCPIP solution dropwise until stays blue / colour stays / no change e.g. conc. vitamin C = vol. of standard Soln. vit C ÷ volume of food extract added Ignore colorimeter, colour charts	Expert (5)

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	• types of {food / fruit}	ALLOW (storage) time / (storage) temperature	Grad (1)

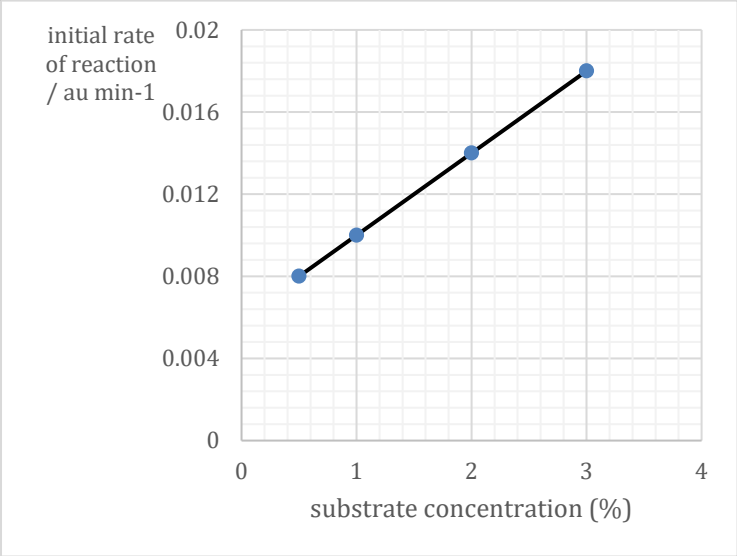
Question Number	Answer	Additional Guidance	Mark
1(c)(i)	An answer that includes the following steps: • concentration at start – concentration after 3 weeks (1) • correct answer to mp1 divided by 3 given to 2 significant figures (1)	correct answer with no working gains both marks e.g. 4.4 – 1.6 = 2.8 e.g. 2.8 ÷ 3 = 0.93, accept .93 ignore sign, 0.93333 would get 1 mark	Expert (2)

Question Number	Answer	Additional Guidance	Mark
1(c)(ii)	An answer that includes the following points: • increase in storage time decreases the vitamin C concentration (in all juices at both temperatures) (1) • vitamin C concentration is less at 4°C (than 20°C) in orange and lime (1) • vitamin C concentration is more at 4°C (than 20°C) in (carrot and) pineapple (1) • very little difference in effect at 4°C and 20°C in carrot (1) • no {range bars / standard deviation} so cannot tell if differences are significant (1)	Piece together vitamin C concentration more affected at 4°C (than 20°C) in orange and lime vitamin C concentration less affected at 4°C (than 20°C) in (carrot and) pineapple (1)	Expert (4)

Question Number	Answer	Additional Guidance	Mark
2(a)(i)	• peptide (bond)		Grad (1)

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	• hydrolysis		Grad (1)

Question Number	Answer	Additional Guidance	Mark
2(b)(i)	• 0.018		Expert (1)

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	A graph showing the following features: • A axes correct (x – substrate concentration / y – initial rate of reaction / (1) • L axes correctly labelled and with units (1) • S suitable scale on the x-axis (1) • P correct plotting on a linear scale on y (1)	 Ignore line Allow percentage concentration for y Allow ecf if miss mp1 for mp3 and 4 Allow use of standard form on y axis Allow ecf from 2bi in the plot including if 2bi blank	Expert (4)

Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	• 1.8		Clerical (1)

Question Number	Answer	Additional Guidance	Mark
2(b)(iv)	An explanation that includes the following points: • the rate increases (linearly) as the substrate concentration increases (1) • because there (is more substrate so) {more collisions / more ES} complexes (1) • does not level off because the {enzyme concentration does not become limiting / enzyme's active sites are not all occupied at the highest substrate concentration} (1)	Accept positive correlation Reverse argument if their graph less steep or plateau after 2% If graph goes down at 3% ignore	expert (3)

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>2(c)(i)</td><td>A table drawn with the following features:

• suitable table drawn (1)

• headings with units (1)

• all data correctly entered (1)</td><td><table><tr><th>pH</th><th>enzyme activity in stem / a.u.</th><th>enzyme activity in fruit / a.u.</th></tr><tr><td>4.(0)</td><td>1.8</td><td>0.7</td></tr><tr><td>7.(0)</td><td>5.1</td><td>2.3</td></tr><tr><td>8.5</td><td>6.6</td><td>2.5</td></tr><tr><td>10.(0)</td><td>1.9</td><td>1.5</td></tr></table>Allow ±0.1 for each cell</td><td>expert (3)</td></tr>
</table>

<table>
<tr><th>Question Number</th><th>Answer</th><th>Additional Guidance</th><th>Mark</th></tr>
<tr><td>2(c)(ii)</td><td>An answer that includes the following points:

• stem (extract) because {more active / higher} (than fruit extract) (1)

• at all pH values (1)

• manipulation of data to support mp 1 (1)</td><td>Accept reverse

Accept ecf if say fruit for mp 1

e.g. stem {4.1 au / 2.64 times} more active at pH 8.5 / comparison of a pair or more of values
Accept ecf if say fruit for mp 1</td><td>expert (3)</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	An answer that includes the following points: • description of the use of all three solutions to grow onions (1) • description of a relevant biotic factor kept constant (1) • description of a relevant abiotic factor kept constant (1) • appropriate measurement of {plant parts / plant} made at start and finish (1) • after {same/ specified / stated} time (1)	No mark if growing in soil e.g. age, variety (ignore species) NOT size as it is DV e.g., light/ temperature / pH of solution e.g. height, length, mass Accept if it is clear all started at same height/mass etc. / if measure difference or increase in height / mass etc. if time quoted must be a week minimum	expert (4)

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	An answer that includes the following steps: • correct values from graph correctly manipulated (1) • correct percentage (1)	e.g. 5g for shoot + bulb, 6.2 g for total e.g. 80.6 (%) correct with no working gains both marks allow even if not in table if no working allow correct answer which is incorrectly rounded for 1 mark (80.64 or 81)	expert (2)

Question Number	Answer	Additional Guidance	Mark
3(a)(iii)	An answer that includes the following points: • as solution concentration goes up growth (of all parts) goes down (1) • the effect of solution concentration on mass is {greatest in shoots / least in roots} (1) • percentage edible is unaffected / little affected by solution concentration (1)	Accept higher / est (for all parts) in ½ strength Accept lower / est (for all parts) in 2x strength Accept reverse argument Allow description of relative effects, e.g. percentage increase in bulbs greatest ALLOW double strength solution reduces edible percentage or reverse Allow ecf if aii wrong	expert (3)

Question Number	Answer	Additional Guidance	Mark
3(a)(iv)	A description that includes three of the following points: • grow several plants in each solution (1) • calculation of (means and) SDs (1) • check for overlap (of means plus and minus SD) for each difference (1) • carry out a statistical test (1)	Accept repeat experiment ALLOW accept ranges, error bars in place of SD ALLOW t test, ignore Chi, correlation	expert (3)

Question Number	Answer	Additional Guidance	Mark
3(b)	An answer that includes the following points: • remove potassium hydrogen phosphate (1) • replace potassium removed / add extra of named salt to adjust balance (1)	Accept don't add KH_2PO_4 / use solution without KH_2PO_4 Ignore remove phosphate ions Accept idea that as there is KNO_3 there is no need to do anything but remove KH_2PO_4	Expert (2)

Question Number	Answer	Additional Guidance	Mark
3(c)	An answer that includes the following points: • because this is the highest (uptake) of all mineral ions • {below 6.5 / at 8.0-8.5} phosphate in short supply / {above 8.0 / below 5.5} nitrate in short supply (1) • needed for appropriate {substance /process} (1) • pH {above / below} this range will denature enzymes (1)	e.g ATP, DNA, RNA, nucleotides, cell division, energy exchange, protein synthesis. Allow ecf from mp2	expert (4)

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