Pearson Edexcel

Mark Scheme (Results)

October 2021

Pearson Edexcel International Advanced Level
In Biology (WB13) Paper 01
Practical Skills in Biology I

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October 2021
Question Paper Log Number P67104A
Publications Code WBI13_01_2110_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

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:
• an idea of the types of response expected
• how individual marks are to be awarded
• the total mark for each question
• examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.

( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer. ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Quality of Written Communication
Questions which involve the writing of continuous prose will expect candidates to:
• write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear · select and use a form and style of writing appropriate to purpose and to complex subject matter · organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.
Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Additional Guidance	Mark
1(a)(i)	A description that includes the following points: • addition of {biuret reagent / base and copper sulfate} (1) • purple colour (1)	 ignore heating accept any spelling which is close unless it is different word (eg burette) ignore extra detail unless contradictory be generous on colour (e.g. pink-purple, lilac, mauve)	**2**

Question Number	Answer	Additional Guidance	Mark
1(a)(ii)	A description that includes the following points: • same mass of (food) sample (1) • same volume of water (for extraction) (1) • control of another aspect of extraction method (1)	 do not accept volume of extract accept solvent e.g. temperature / length of time of extraction / type of filter paper do not accept conditions for filtrate storage.	**3**

Question Number	Answer	Additional Guidance	Mark
1(a)(iii)	An explanation that includes the following points: • A semi-quantitative test gives {an estimate / a range} of the concentration of a substance (1) • A quantitative test determines the exact concentration of a substance (1)	 Allow involves an element of judgment such as comparison / subjective Allow gives an eg {absolute / precise / specific / accurate / valid} value / it is objective done using colorimeter	**2**

Question Number	Answer	Additional Guidance	Mark
1(a)(iv)	An explanation that includes the following points: • (the diagram shows that) a darker colour = more protein (1) • the {solution / result} of a ({biuret / food}) test is compared with (the tubes in) the diagram (1) • therefore the concentration is estimated by deciding which of the (known) protein solutions in the diagram is closest to the (food test) result (1)	 accept reverse accept just result (of test / experiment etc.) compared	**2**

Question Number	Answer	Additional Guidance	Mark
1(b)(i)	An answer including the following steps : • protein in milk 505 x 6.38 = 3221.9 / 3222 (1) • ratio = 20556 ÷ (3221.9 / 3222) = 6.4(:1) (1)		correct answer with no working gains 2 marks **2**

Question Number	Answer	Additional Guidance	Mark
1(b)(ii)	• credit named example of an organic molecule containing nitrogen		**1**

Question Number	Answer	Additional Guidance	Mark
2(a)(i)	An explanation that includes the following points: • because the same {light source / filter / size cuvette} used for all measurements (1) • because zeroing / calibrating (1) • because objective measurement (1) • because no light lost / gained (1)	described	**3**

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	An answer that includes the following points : • temperature, use of thermostatically controlled water bath / incubator (1) • pH, use of buffer (1)	accept room	**2**

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

• suitable table drawn (1)

• headings with units (1)

• all data correctly entered (1)</td><td>
<table>
<tr><td></td><td colspan="2">Loss of betalain from beetroot cells / a.u.</td></tr>
<tr><td>Concentration of salt / mmol dm^{-3}</td><td>with ammonium sulfate</td><td>with calcium chloride</td></tr>
<tr><td>0.00000</td><td>0.30</td><td>0.30</td></tr>
<tr><td>0.00025</td><td>0.46</td><td>0.29</td></tr>
<tr><td>0.00200</td><td>0.50</td><td>0.15</td></tr>
<tr><td>0.02000</td><td>0.47</td><td>0.02</td></tr>
</table>
Allow
0.00025 to 0.0003 second cell, first column
</td><td>3</td></tr>
</table>

Question Number	Answer	Additional Guidance	Mark
2(b)(ii)	An answer including of the following points : Similarities • both salts affect leakage (1) • in both, greatest effect is over a small initial increase in salt concentration (1) Differences • calcium chloride causes {leakage / intensity of colour} to decrease, ammonium sulfate causes {leakage / intensity of colour} to increase, (with increase in concentration) (1) • a small initial change in ammonium sulfate concentration causes a larger change in leakage compared with a small initial change in calcium chloride concentration (1)	accept effect on permeability for calcium chloride inverse, for ammonium sulfate direct relationship accept higher / lower loss for {Ammonium Sulfate / Calcium Chloride}	**3**

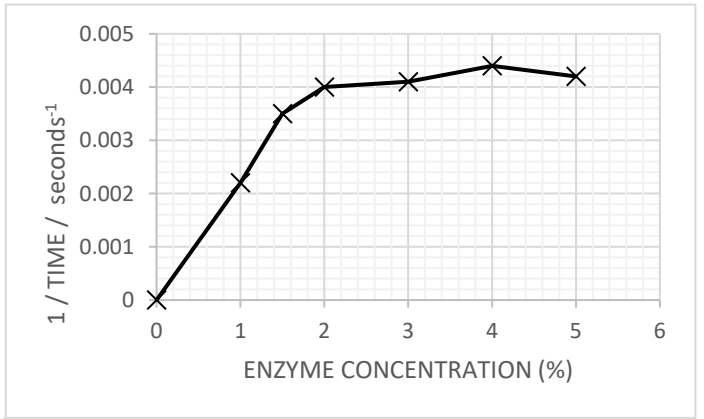
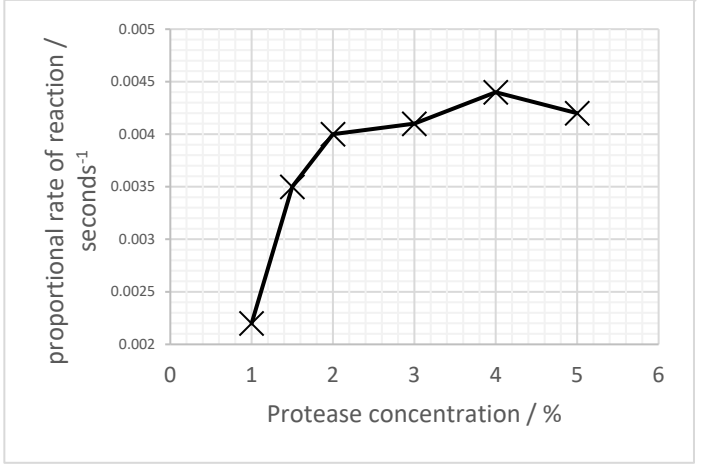
Question Number	Answer	Additional Guidance	Mark
2(b)(iii)	An answer including the following steps : • figures read off graph for $CaCl_2$ (A) and $(NH_4)_2SO_4$ (B), B-A = C (1) • C ÷ A × 100 = D (%) (1)	allow ecf e.g. {0.48 / 0.49} - 0.09 = {0.39 / 0.40} accept anything between 0.48 and 0.49 0.39 ÷ 0.09 = 433 / 433.3 / 433.33 (%) 0.40 ÷ 0.09 = 444 / 444.4 / 444.44 (%) OR 0.39 ÷ 0.49 = 80 / 79.6 / 79.59% 0.40 ÷ 0.49 = 82 / 81.6 / 81.63%	correct answer with no working gains 2 marks **2**

Question Number	Answer	Additional Guidance	Mark
2(c)(i)	An answer including the following points : • with calcium chloride and ammonium sulfate the {leakage / permeability / intensity of colour} is more than with calcium chloride alone (1) • with ammonium sulfate, leakage increased (compared with water) (1) • {pattern is the same in both lines in second experiment / described} (1) • at 0.010 mmol dm^{-3} calcium chloride alone {leakage / intensity of colour} is {equal / only slightly different} to that with ammonium sulfate with calcium chloride (1) • calcium chloride can reverse the effects of ammonium sulfate (on membranes) (1)	accept increasing calcium chloride conc. leads to decrease in intensity of colour (etc) with or without ammonium sulfate accept correct figures quoted	**3**

Question Number	Answer	Additional Guidance	Mark
2(c)(ii)	An answer including the following points : • repeat readings at 0.002 mmol dm^{-3} (1) • under same conditions (each time) (1) • calculate (mean and) standard deviation (1)	accept error bar accept ref to SD accept perform t-test	**3**

Question Number	Answer	Additional Guidance	Mark
3(a)(i)	time taken for the film to become clear	accept how long it takes	**1**

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	An description including the following points: • carry out the experiment described at constant {temperature / substrate / enzyme concentration} (1) • at a range of pHs (controlled by buffers) (1) • choose the pH which gives a time which is not {too short / too long} (for practicality) (1)		**3**

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	A graph with the following features: • A axes correctly orientated (1) • L axes correctly labelled and with correct units (1) • P correct plotting on a linear scale (1) • R points joined with ruled straight line (1)	E.G.   	**4**

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	An answer including the following points: • as enzyme concentration increases (proportional) rate of reaction also increases (1) • as enzyme concentration increases there are more {active sites / collisions / ES complexes formed} (1) • it levels off (1) • because substrate becomes limiting (1)	accept time taken decreases	**4**

Question Number	Answer	Additional Guidance	Mark
3(c)(i)	An answer including the following points: • {the rate of the reaction slows down / gelatine is used up (over time)} (1) • so rates can be validly compared / compared only if they are all initial rates (1)	 accept rate of reaction changes over time	 **2**

Question Number	Answer	Additional Guidance	Mark
3(c)(ii)	An answer including the following points: • measure transparency of film over time (1) • plot transparency against time (1) • calculate (initial rate from) gradient of straight part of graph at the beginning (1)	 accept measure intensity of colour of liquid in which film suspended accept plot of whatever measured for mp1 against time tangent	 **3**

Question Number	Answer	Additional Guidance	Mark
3(d)	An answer including the following points: • Dilution factor calculated (1) • Volume of 5% solution and water stated (1)	 e.g. 5 ÷ 2= 2.5 accept $C_1V_1 = C_2V_2$ accept 4 stock to 6 water e.g. 1 cm^3 of 5% added to 1.5 cm^3 of water 0.4 cm^3 of 5% to 0.6 cm^3 water 2 cm^3 to 3 cm^3 of water correct answer with no working gains 2 marks	**2**

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