PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

BIOLOGY



MARK SCHEME

TOPIC 1: BIOLOGICAL MOLECULES

CORE PRACTICAL 1

SCORE	PERCENTAGE
/48	%

STEMUP

These questions belong to Pearson Edexcel, not to us.

The examination questions and mark schemes in this pack were written and published by Pearson Edexcel. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with Pearson Edexcel and does not own, and makes no claim to own, any of the question or mark scheme material in this pack. Pearson has not endorsed, approved or been involved in the production of it. Pearson, Edexcel and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

Pearson publishes its past papers and mark schemes free of charge. Always check the current specification at qualifications.pearson.com before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Mark Scheme

Q1.

Question Number	Answer	Additional Guidance	Mark
(i)	An answer including two of the following variables with suitable methods of control: • appropriate named variable (1) • description of how the variable is controlled (1) • appropriate named second variable (1) • description of how second variable is controlled (1)	eg • volume of hydrogen peroxide / accept stated volume - measuring cylinder / syringe / pipette (to measure same volume) • concentration of hydrogen peroxide / accept stated concentration – dilute / make up solution to same % concentration / use of stock solution • temperature / accept stated temp - flask in **thermostatically controlled** waterbath / accept descriptions • pH / accept stated pH – buffer in flask	**Exp (4)**

Question Number	Answer	Additional Guidance		Mark
(ii)	Initial rate of reaction calculated (1)	Answer uses **seconds**	0.33 $cm^3 s^{-1}$	**Grad (1)**
		Accept: values in range:	0.28 to 0.35 $cm^3 s^{-1}$	
		Accept: cm^3/s : cm^3 per second		
		Answer uses **minutes**	19.8 $cm^3 min^{-1}$	
		Accept: values in range	16.8 to 21.0 $cm^3 min^{-1}$	
		Accept: cm^3/min : cm^3 per min		

Question Number	Answer	Additional Guidance	Mark
(iii)	An explanation including the following • {hydrogen peroxide / substrate} is {converted to products / used up} (1) • so less substrate to collide with the enzyme (1)	Accept {hydrogen peroxide / substrate} becomes a limiting factor Accept concentration of {hydrogen peroxide / substrate} decreases Accept less substrate so fewer enzyme-substrate complexes form	**Exp (2)**

Q2.

Question Number	Answer	Additional Guidance	Mark
(i)	An answer that makes reference to two of the following: • less needed for same sweet effect (1) • therefore less {energy / calorie} intake (1) • therefore less risk of appropriate named health benefit (1)	**e.g.** reduced obesity / (type 2) diabetes / tooth decay / heart disease / atherosclerosis / high blood pressure / CVD / CHD	**(2)**

Question Number	Answer	Additional Guidance	Mark
	• 0.066 to 0.074	**DO NOT ACCEPT** 0.06°	**(1)**

Question Number	Answer	Additional Guidance	Mark
(iii)	An answer that makes reference to the following: • with and without magnesium ions (1) • use same {volume / stated cm^3 / concentration} of isomerase enzyme (1) • use excess {glucose / substrate} (1) • control {temperature / pH} (1) • repeat to {calculate mean / calculate average / standard deviation / standard error / recognise anomalies} (1)	**ACCEPT** same mass **DO NOT ACCEPT** if in list	**(5)**

Q3.

Question Number	Acceptable Answer	Additional Guidance	Mark
(i)	An explanation that makes reference to the following: • (as) wavelength of light decreases, rate of photosynthesis increases (1) • because the data show a greater colour change at shorter wavelengths of light, indicating faster CO_2 uptake (by alga) (1)	ACCEPT converse throughout	**(2)**

Question Number	Indicative content
* **(ii)**	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. • the trend of the results is opposite in the two repeats: results are not reliable • variables such as organism and indicator are controlled whereas variables such as temperature and light intensity are not controlled • colour changes judged by eye are qualitative and not precise • fastest rate is seen with the last filter used, therefore temperature may be responsible for change in rate • experiment left for 30 minutes, other additional times would give extra information about the rate • coloured indicator may affect the wavelengths of light reaching the algae • the algae will be respiring and producing CO_2, which complicates measurement of the rate of photosynthesis • rate of respiration is assumed to be constant, but this may not be the case • changes in temperature or pH may alter the activity of the enzymes responsible for photosynthesis • conclusion that the experiment is invalid / not measuring effect of wavelength on photosynthesis

Level	Marks	Descriptor
Level 0	**0**	No awardable content
Level 1	**1-3**	Limited scientific judgement made with a focus on mainly one aspect. A few strengths or weaknesses identified. A conclusion may be attempted, demonstrating isolated elements of biological knowledge and understanding but supported with limited evidence.
Level 2	**4-6**	Scientific judgements are made through the application of relevant evidence, referring to both methods and trends in results. Both strengths and weaknesses are identified. A conclusion is made with reference to more than one piece of evidence, demonstrating links to biological knowledge and understanding.
Level 3	**7-9**	Scientific judgements are made through detailed analysis and interpretation of relevant evidence including trends in results and several aspects of methodology. Both strengths and weaknesses are identified in both methods and results. A conclusion is made, demonstrating sustained linkages to biological knowledge and understanding and drawing upon several strands of evidence.

Q4.

Question Number	Correct Answer	Additional guidance	Mark
(a)	An explanation that makes reference to the following: • initial concentration of casein will change quickly (1) • because enzymes cause large increase in reaction rates (1) • therefore only initial rate will measure the speed of reaction at the correct value of the independent variable/concentration of casein (1)	Active site occupation Substrate becomes limiting	**(3)**

Question Number	Correct Answer	Additional guidance	Mark
(b)(i)	An explanation that makes reference to the following: • absorption has not decreased for 0.1% from 20 s to 30 s/reaction has stopped after 20 s/substrate has been used up (1) • but all other concentrations show a consistent change every 10 s for the whole 30 s (1)		**(2)**

Question Number	Correct Answer	Additional guidance	Mark
(b)(ii)	An explanation that makes reference to the following: • an appropriate casein concentration chosen because substrate is not limiting (1) • absorption recorded in first 20s in order to obtain initial rates (1)		**(2)**

Q5.

Question Number	**Answer**	**Mark**
	An answer that makes reference to four of the following: • use liver with same surface area to volume ratio (1) • control temperature (1) • control {volume / concentration} of hydrogen peroxide (1) • replace bung quickly (1) • use gas syringe to collect oxygen (1)	**(4)**

Q6.

Question Number	Answer	Additional Guidance	Mark
	An answer that makes reference to six of the following: • make extract of pineapple juice (1) • same {volume of skimmed milk / volume of pineapplejuice extract} (1) • {use colorimeter to measure changes in absorbance withtime / beaker over a black cross and time to disappear} (1) • calculation of initial rate (1) • at a range of temperatures using a water bath (1) • pH controlled using buffer (1) • plot graph of initial rate against temperature (1)	Allow other appropriate methods Allow use colorimeter to measure transmission Allow measure absorbance every 30s Allow 10 – 80°C (must be at least 5 temps)	**(6)**

Q7.

Question Number	Answer	Additional Guidance	Mark
	An answer that makes reference to five of the following: • (put albumin tubes into a) range of at least five pepsin concentrations (1) • control {temperature using water bath / pH using buffer} (1) • use same {concentration / source / mass / length / volume} of albumin (1) • leave for {same / stated} time or measure at regular time intervals (1) • measure {length of albumin remaining / mass of albumin} (at end of investigation) (1) • {use several capillary tubes / repeat} and {calculate mean / calculate SD / identify anomalies} (1) • control tube with no enzyme (for comparison) (1)	Time how long it takes for albumin to disappear = 2 marks Accept measure absorbance using a colorimeter	(5)