

Biological Molecules

Mark Scheme 3

Level	IGCSE(9-1)
Subject	Biology
Exam Board	Edexcel IGCSE
Module	Single Award (Paper 2B)
Topic	Structure and Functions in Living Organisms
Sub-Topic	Biological Molecules
Booklet	Mark Scheme 3

Time Allowed: 86 minutes

Score: /71

Percentage: /100

Grade Boundaries:

9	8	7	6	5	4	3	2	1
>90%	80%	70%	60%	50%	40%	30%	20%	10%

Question number	Answer	Notes	Marks												
1(a)	<table border="1"> <thead> <tr> <th data-bbox="436 355 929 424">pH of amylase solution</th> <th data-bbox="934 355 1426 424">diameter in mm</th> </tr> </thead> <tbody> <tr> <td data-bbox="436 427 929 491">2</td> <td data-bbox="934 427 1426 491">10 ± 1</td> </tr> <tr> <td data-bbox="436 494 929 558">4</td> <td data-bbox="934 494 1426 558">(15)</td> </tr> <tr> <td data-bbox="436 561 929 625">7</td> <td data-bbox="934 561 1426 625">20 ± 1</td> </tr> <tr> <td data-bbox="436 628 929 692">9</td> <td data-bbox="934 628 1426 692">14 ± 1;</td> </tr> <tr> <td data-bbox="436 695 929 759">13</td> <td data-bbox="934 695 1426 759">(10)</td> </tr> </tbody> </table>	pH of amylase solution	diameter in mm	2	10 ± 1	4	(15)	7	20 ± 1	9	14 ± 1;	13	(10)		1
pH of amylase solution	diameter in mm														
2	10 ± 1														
4	(15)														
7	20 ± 1														
9	14 ± 1;														
13	(10)														
(b) (i)	1. digestion / break down; 2. no starch;	Breaks down all the starch = 2 Breaks down starch = 1	2 max												
(b) (ii)	1. (amylase/enzyme) denatured at pH 2 or 13 / low or high pH; 2. optimum / works best at pH 7; 3. enzymes work less well at pH 9 or pH 4;		2 max												
(c)	pH;		1												

<p>(d)</p>	<p>1. <u>volume</u> of amylase; 2. concentration of amylase; 3. same amylase / source of amylase; 4. depth of agar; 5. time;</p>	<p>Mp 1 ignore amount Ignore concentration of starch / agar / iodine</p>	<p>3 max</p>
<p>(ii)</p>	<p>1. 0 for pH 2 and pH 13; 2. wider for pH 7 than at 20 °C;</p>	<p>Check position of wells</p>	<p>2</p>

Total 11 marks

Question number	Answer	Notes	Marks
2 (a) (i)	<u>length</u> of egg white;		1
(ii)	1. repeated / five tubes used / eq; 2. similar pattern / no anomalies / small range / eq;		2
(iii)	ruler / scale / eq;	must state apparatus	1
(b) (i)	1. no enzyme / no protease / no named protease; 2. no digestion / no break down;	ignore no change in length allow converse	2
(ii)	1. enzyme denatured / changed active site / enzyme destroyed; 2. high temperature / heat / eq;	2. ignore boiled	2
(c)	1. acid and alkali / range of pH / different pHs / change pH; 2. no boiling of pancreas juice; 3. same <u>volume</u> of juice/enzyme / same <u>concentration</u> of juice/enzyme;	3. ignore amount	2

(Total for Question = 10 marks)

Question number	Answer	Notes	Marks
3 (a)	37;	units not required	1
(b)	1 (further) away from optimum temp; 2 low (kinetic) energy / less movement / eq; 3 few collisions / enzyme substrate complexes / eq;	allow converse for each marking point	max 2
(c)	1 denatured; 2 active site; 3 no longer fit / no longer bind / changes shape / deformed / eq;	ignore enzyme destroyed reject enzyme killed	2 max
(d)	1 (less) oxygen; 2 (less) glucose; 3 (less) (aerobic) respiration / <u>anaerobic</u> respiration; 4 lactic acid / acidic; 5 low pH; 6 inhibits enzymes / affect enzymes / eq;		4 max
		Total	9

Question number	Answer	Notes	Marks
4(a)	1. smoking; 2. dust /asbestos / working in mines; 3. fumes; 4. genetic / lack of A1T; 5. bronchitis;	Ignore infection	2
(b)	1. digest / breakdown / kill / destroy; 2. bacteria / pathogens / viruses/ microorganisms; 3. prevent infection/disease/reproduction;		2
(c)	2 268 000;;	1 mark for 0.80 / 80% / $80 \div 100$ / divide by 10 multiply by 8	2
(d)	(i) alveoli / alveolus; (ii) 1. less surface area; 2. <u>diffusion</u> / gas <u>exchange</u> ; 3. (insufficient) oxygen;	Mark first answer in a list	1 2

Question number	Answer	Notes	Marks
(e)	<ol style="list-style-type: none"> 1. <u>memory</u> cells; 2. antibodies; 3. (production and response) sooner / quickly / faster / more / last longer / eq; 	<ol style="list-style-type: none"> 2. Allow if production by incorrect cell 3. Ignore more robust / more powerful 	2
(f)	<ol style="list-style-type: none"> 1. less mucus / digests mucus / breaks down mucus / thinner mucus / runny mucus; 2. wider airways/tubes / more space / less blockage / open up /eq; 3. more air / more oxygen; 	<ol style="list-style-type: none"> 2. Ignore easier to breath 3. Allow more oxygen into blood 	2
(ii)	<ol style="list-style-type: none"> 1. increases concentration of oxygen / increases concentration gradient / more oxygen; 2. (more) diffusion / (faster) diffusion / (more) gas exchange; 	Greater diffusion gradient = 2	2

Total 15 marks

Question number	Answer	Notes	Marks
5(a) (i)	amino acids / protein / DNA / RNA / nucleic acid;		1
(ii)	nitrogen-fixing;	Allow <i>Rhizobium</i>	1
(b)	1. nitrifying (bacteria) / nitrification; 2. nitrite (to nitrate);		2
(c) (i)	1. more movement / more (kinetic) energy / eq; 2. more collisions / more enzyme substrate complexes / eq;		2
(ii)	1. <u>denatured</u> ; 2. <u>active site</u> ; 3. shape altered / bonds broken / eq; 4. substrate no longer fits / eq;	1. Ignore inactive / destroyed 1. Reject death	3

Total 9 marks

Question number	Answer	Notes	Marks
6(a)	respiration / aerobic respiration / anaerobic respiration;		1
(b)	pollination / transfer pollen / eq;	Ignore reproduction / collect nectar	1
(c)	1. producer; 2. <u>secondary consumer</u> 3. <u>tertiary consumer</u> ;	Reject primary consumer Ignore carnivore	2
(d)	1. avoids closing unnecessarily / by accident / due to wind / debris / when no insect is present / only closes with an insect / must be a <u>big</u> insect / eq; 2. avoids wasting energy / enzymes / digestive fluid;		2
(e)	1. solution (more) concentrated / reduced water potential / less water in cell / more ions / minerals / solutes / high salt concentration / eq; 2. water enters by <u>osmosis</u> ;	Allow converse for Mp1 Ignore water concentration	2

(f)	<p>1. prevent infection / disease / may be pathogenic;</p> <p>2. prevent competition (for food) / prevent loss of energy from insect / prey;</p>	<p>Ignore harm / illness / produce toxins</p> <p>Eg. prevent decomposition of insect / feeding on insect / taking nutrients from insect / digesting insect</p> <p>Ignore digesting / decomposing / feeding on plant</p>	2
(g)	<p>(slower rate)</p> <p>1. no/less mechanical digestion / mechanical breakdown / not broken into pieces / eq;</p> <p>2. less surface area / small SA:VOL;</p> <p>3. (for) enzymes;</p>	<p>Allow converse</p> <p>Ignore crush / chew</p>	Max 2
(ii)	<p>protease / carbohydrase / lipase / eq;</p>	<p>Allow any named digestive enzyme</p>	1

(h)	<p>1. temperature;</p> <p>2. (kinetic) energy / collisions / <u>movement</u> of molecules / enzymes / substrates / more enzyme substrate complexes;</p> <p>OR</p> <p>3. size / shape / mass of insect;</p> <p>4. (surface area for) enzyme contact / eq;</p> <p>OR</p> <p>5. composition of insect / type of insect;</p> <p>6. exoskeleton / indigestible;</p> <p>OR</p> <p>7. amount of enzyme / enzyme concentration;</p> <p>8. collisions / more enzyme substrate complexes / eq;</p>	<p>Pairs of Mps are linked</p> <p>Ignore enzymes work faster / denature</p> <p>Ignore pH</p> <p>Ignore shell</p>	<p>Max 4</p>
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Total 17