PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

BIOLOGY



MARK SCHEME

TOPIC 1: BIOLOGICAL MOLECULES

WATER

SCORE	PERCENTAGE
/25	%

STEMUP

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Mark Scheme

Q1.

Question Number	Indicative content
*	Answers will be credited according to candidates' 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. Indicative content Descriptions (D) • A, B increase Carrico index / alveolar expansion • A and B together gives the highest level of improvement in Carrico index / more than natural surfactant • Both compounds A and B together are best to treat ARDS / increase the Carrico index • A alone is least effective • B increases Carrico index more than A • in all cases, the improvement is rapid and persists from 30 to 120 minutes Analysis (A) • valid comparison with natural surfactant / control • B has similar increase in Carrico index as natural surfactant / control • A has lower increase compared to natural surfactant / control • positive correlation between alveoli expansion and Carrico index • improving alveoli expansion results in improvement in blood oxygenation which improves Carrico index • the artificial surfactants allow alveoli to expand, increasing surface area and oxygen diffusion into blood • unaffected baby has index of 67 which is what A and B reach Potential use (P) • rabbits may not respond in the same way as humans to the compounds • may not be safe in humans • small sample size • no comparison has been made with no surfactant

Level	Marks	
0	0	No awardable content
1	1-2	An explanation may be attempted but with limited interpretation or analysis of the scientific information with a focus on mainly just one piece of scientific information. The explanation will contain basic information with some attempt made to link knowledge and understanding **Only D**
2	3-4	An explanation will be given with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows some linkages and lines of scientific reasoning with some structure. **D + A or D+ P**
3	5-6	An explanation is made which is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows a well-developed and sustained line of scientific reasoning which is clear and logically structured. **D+A+P**

Q2.

Question Number	Answer	Additional Guidance	Mark
	An explanation that makes reference to four of the following: • because 30 °C is an appropriate temperature for one species and provides enough oxygen for the other species **(1)** • because if the temperature was above {30 / 40} °C there would be less oxygen dissolved in it **(1)** • so there would not be enough oxygen for {respiration / metabolism / ATP production} **(1)** • because if the temperature was above {25 / 30} °C the enzymes would be denaturing **(1)** • because the temperature was below {25 / 30} °C the enzymes would not have enough {kinetic energy / collisions / enzyme substrate complexes} **(1)**	**Accept** because 30 °C satisfies the requirements of both fish **Do not accept** start to denature **Accept for 1 mark** 30 °C is close to the optimum temperature for the enzymes	**(4)**

Q3.

Question Number	Answer	Mark
(i)	The only correct answer is C hydrogen *A is incorrect because covalent bonds do not form between neighbouring water molecules* *B is incorrect because ionic bonds to not form between neighbouring water molecules* *D is not correct because hydrophobic bonds do not form between neighbouring water molecules*	**1**

Question Number	Answer	Mark
(ii)	The only correct answer is C three *A is incorrect because there are three components* *B is incorrect because there are three components* *D is incorrect because amino acids are not a component*	**1**

Q4.

Question Number	Answer	Additional Guidance	Mark
	An explanation that makes reference to five of the following: • because there would be less water to take up from the soil (1) • therefore there will be fewer {mineral ions / minerals} (transported to the rest of the plant / taken up) (1) • example of a mineral ion deficiency on the plant explained (1) • there will be less water for {photolysis / light-dependent reaction / photosynthesis} (1) • therefore there will be less GALP produced in the {light-independent reaction / Calvin cycle} (1) • therefore less {NPP / plant biomass} (1)	**ACCEPT** plants will {wilt / die} without water **ACCEPT** less glucose produced	(5)

Q5.

Question Number	Correct Answer	Additional guidance	Mark
	D		**(1)**

Q6.

Question Number	Answer	Additional Guidance	Mark
	An explanation that makes reference to the three of the following: • water has a (small) positively charged {hydrogen / end} and a (small) negatively charged {oxygen / end} (1) • therefore hydrogen bonds form (between water molecules) (1) • therefore water moved due to {cohesion / cohesive forces} (between water molecules) (1) • (because of) {adhesion / adhesive forces} between water andxylem (1)	**ACCEPT** cohesive properties **ACCEPT** adhesive properties water moves due to adhesive and cohesive forces =1 mark if no other mark awarded	(3)

Q7.

Question Number	Answer	Additional Guidance	Mark
(i)	• 2.0 / 1.9 / 1.93 (times / ×)	**DO NOT ACCEPT** 1.93 recurring	(1)
(ii)	An explanation that makes reference to three of the following: • water is more effective than culture media for washing (1) • {water is not the solvent / ethanol is the solvent} for fucoxanthin(1) • ethanol {increases permeability of / disrupts} (cell / vacuole)membrane (1) • more fucoxanthin extracted in method A (compared with methodB) because water enters the seaweed {by osmosis / causing the cells to burst} (1)	**ACCEPT** more fucoxanthin extracted in A becausewashed with water	(3)