

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

Specimen for 2007 (version 2)

GCE A LEVEL

MARK SCHEME

MAXIMUM MARK: 30

SYLLABUS/COMPONENT: 9700/05

**BIOLOGY
PLANNING, ANALYSIS AND EVALUATION**



Question	Expected answer	Mark	AO
1	(a) (i) As the concentration of carbon dioxide increases the rate of photosynthesis increases (until another factor becomes limiting); (ii) <i>Independent:</i> concentration of carbon dioxide/hydrogen carbonate solution; <i>Dependent:</i> Volume/amount of gas/oxygen collected; <i>Accept</i>, rate of photosynthesis	1	P
	(b) any 5 of: ref. to a range of hydrogen carbonate solutions of known concentration; <i>Accept</i>, ref. to expose to atmosphere with different known concentrations of CO₂ ref. to gas syringe plunger fully inserted; ref. to inserting stopper after attaching syringe; ref. to equilibration time before measuring any gas produced; ref. to reading volume after specific time; time to collect stated volume; ref. to repeating each measurement; AVP (e.g. detail of means of ensuring that gas syringe is read accurately/consistently);	2	P
	(c) identification of 4 appropriate variables; quantity of aquatic plant – same mass/number of leaves/same plant; volume of test solution – same volume of each concentration; temperature – immerse the test solution in water bath at same temperature/use an air conditioned room; light intensity – use same light source at same distance from plant/means of controlling and measuring light intensity (in dark room/enclosed box); wave length – use same light source with same voltage/current/power/light temperature	5	M
	(d) 1 of: gases dissolved in the pond water are removed/only gases from the plant are collected; microscopic plants that may use carbon dioxide are killed;	1	P
		4	M

(e) 1 of:

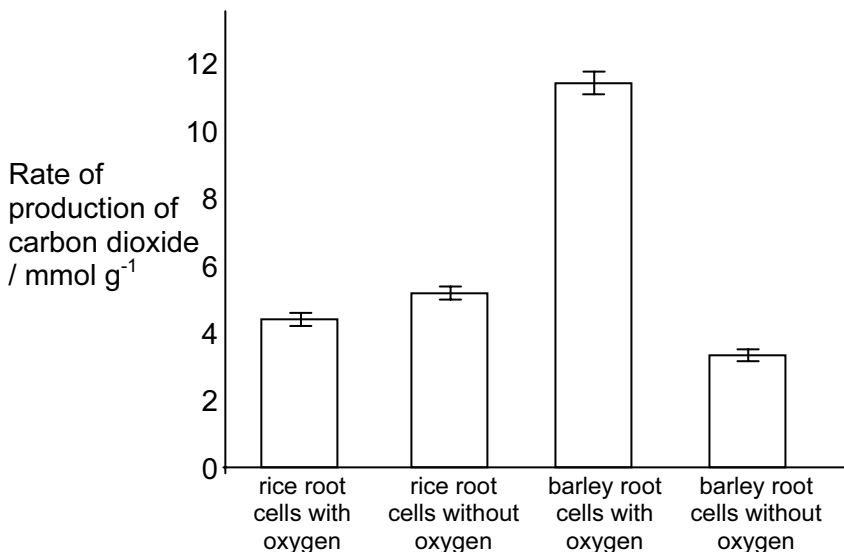
hazard associated with hydrogen carbonate solution;

hazard associated with the source of the pond water;

1 P

5P

Total 15 10M

Question	Expected answer	Mark	AO
2 (a) (i)	0.14;	1	D
(ii)	barley root cells with oxygen is less reliable than the others; spread of data /standard deviation/standard error is greater; OR significant difference between (all of/any of) treatments; error bars do not overlap;	2	D
(iii)	axes correct orientation and labelled;	1	D
	all plots correct (means 4.5,5.5,11.4,3.3);	1	D
	error bars plotted from standard error;	1	D
	error bars correctly placed and plotted;	1	D
	(allow error carried forward if standard deviation used)		
	 Rate of production of carbon dioxide / mmol g⁻¹ rice root cells with oxygen rice root cells without oxygen barley root cells with oxygen barley root cells without oxygen		
(b)	3 of ref. to: rice without oxygen grows better than rice with oxygen; rice is adapted to grow in anaerobic/water logged conditions, grows better than barley without oxygen; rice can tolerate the ethanol produced by anaerobic respiration/barley seeds killed by ethanol produced by anaerobic respiration;		
	aerobic respiration releases more energy than anaerobic, barley grows faster/more with oxygen;	3	C

7D

Total 10 3C

Question	Expected answer	Mark	AO
3	(a) $\frac{(7.5 - 6.2)}{6.2} \times 100 = \frac{1.3}{6.2} \times 100 = 0.21 \times 100 = 21\%$; accept 21.0% or 20.97% reject 45% as obvious but incorrect (b) <i>support</i> mean value of experimental cell culture is higher (than control); bottom or range higher / top of range higher, in experimental cell culture (than control) / AW; <i>does not support</i> range overlaps / ref. to specific examples of control and experimental samples which are the same (e.g. control 6 and experimental 8 which are both 6.5); ref. to possible anomalies / specific named anomaly from the list experimental samples 4 or 7 / control samples 3 or 5 or 10; ref. to insufficient replication (for such variable data); no statistical test of difference carried out / do not know if the difference is significant / no chi squared test / no t-test / no standard error bars plotted; only one concentration tested / ref. limited range / AW;	[1]	
		[max 4]	