

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

(e) 1 of:

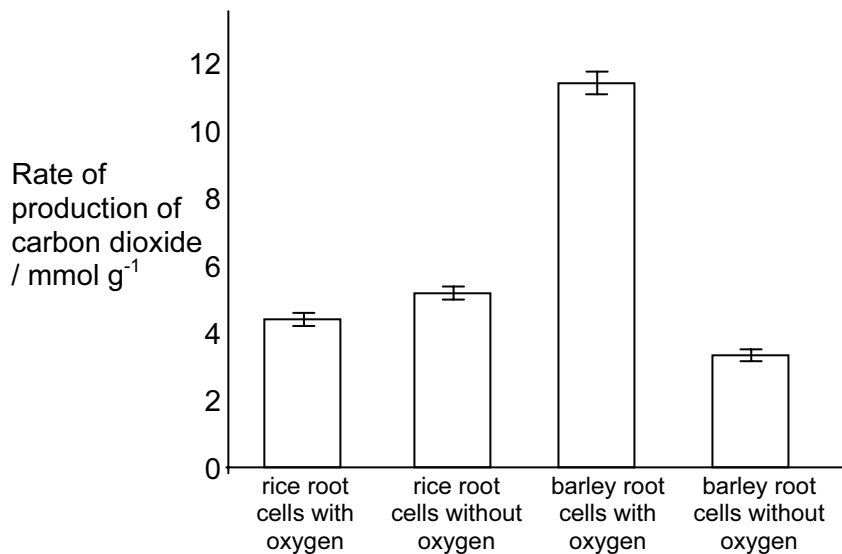
hazard associated with hydrogen carbonate solution;  
hazard associated with the source of the pond water;

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)		



- (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	<p>(a) <math>\frac{(7.5 - 6.2)}{6.2} \times 100 = \frac{1.3}{6.2} \times 100 = 0.21 \times 100 = 21\%</math>;</p> <p>accept 21.0% or 20.97% reject 45% as obvious but incorrect</p>	[1]
	<p>(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;</p> <p><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);</p> <p>ref. to possible anomalies / specific named anomaly from the list experimental samples 4 or 7 / control samples 3 or 5 or 10;</p> <p>ref. to insufficient replication (for such variable data);</p> <p>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;</p> <p>only one concentration tested / ref. limited range / AW;</p>	[max 4]