

Version 1



General Certificate of Education (A-level)
June 2011

Biology

BIO3X

(Specification 2410)

**Unit 3X: Externally Marked Practical
Assignment.**

Final

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

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BIO3X TASK 1

Question	Marking Guidance	Mark	Comments
1	To mix (the contents) / Increase chance of enzyme-substrate collisions; To see the curd;	2	Accept 'to distribute contents' or 'to enable contents to react' for first point.
2(a)	Difficult to decide when curd is present / is subjective; Difficult to judge time; Method/degree of rotation;	2 max	
2(b)	(Time taken) to solidify; Measure volume of liquid remaining; Weight/mass of curd produced;	2 max	Accept 'amount' as alternative to volume and weight/mass.
3	Practice in seeing when curd appears/approximate time of curd appearance known, so able to watch more carefully at this time;	1	Accept ideas relating to 'you know what to look for'.
	Total	7	

BIO3X TASK 2

Question	Marking Guidance	Mark	Comments																								
4	<p>Completion of concentration table</p> <table border="1" data-bbox="309 432 1070 772"> <thead> <tr> <th data-bbox="309 432 517 501"></th> <th colspan="5" data-bbox="517 432 1070 501">Concentration of milk/%</th> </tr> <tr> <th data-bbox="309 501 517 569"></th> <th data-bbox="517 501 629 569">40</th> <th data-bbox="629 501 734 569">55</th> <th data-bbox="734 501 840 569">70</th> <th data-bbox="840 501 945 569">85</th> <th data-bbox="945 501 1070 569">100</th> </tr> </thead> <tbody> <tr> <td data-bbox="309 569 517 671">Volume of milk/cm³</td> <td data-bbox="517 569 629 671">8</td> <td data-bbox="629 569 734 671">11</td> <td data-bbox="734 569 840 671">14</td> <td data-bbox="840 569 945 671">17</td> <td data-bbox="945 569 1070 671">20</td> </tr> <tr> <td data-bbox="309 671 517 772">Volume of water/cm³</td> <td data-bbox="517 671 629 772">12</td> <td data-bbox="629 671 734 772">9</td> <td data-bbox="734 671 840 772">6</td> <td data-bbox="840 671 945 772">3</td> <td data-bbox="945 671 1070 772">0</td> </tr> </tbody> </table>		Concentration of milk/%						40	55	70	85	100	Volume of milk/cm ³	8	11	14	17	20	Volume of water/cm ³	12	9	6	3	0	1	
	Concentration of milk/%																										
	40	55	70	85	100																						
Volume of milk/cm ³	8	11	14	17	20																						
Volume of water/cm ³	12	9	6	3	0																						
5	<p>Data presented clearly with full descriptions of both the independent and dependent variable i.e. ‘Concentration of milk’ and ‘Time taken for curd to appear’;</p> <p>Concentration of milk in first column;</p> <p>Units stated clearly and only in the heading to the appropriate columns;</p> <p>Quality of data</p> <table data-bbox="309 1193 1070 1294"> <tr> <td data-bbox="309 1193 840 1227">A clear trend</td> <td data-bbox="840 1193 1070 1227">2 marks</td> </tr> <tr> <td data-bbox="309 1227 840 1260">Does not follow trend</td> <td data-bbox="840 1227 1070 1260">1 mark</td> </tr> <tr> <td data-bbox="309 1260 840 1294">No results</td> <td data-bbox="840 1260 1070 1294">0 marks</td> </tr> </table>	A clear trend	2 marks	Does not follow trend	1 mark	No results	0 marks	5	<p>This may be recorded either by a full title or by complete headings at the top of the table (e.g. if ‘Concentration’ and ‘Time’ only recorded in the table, the title should give more detail by reference to milk and appearance of curd.</p> <p>Although AQA uses the IOB convention of separating units by a solidus (/), credit should not be awarded or withheld for the way in which they are presented, provided they are clear. Time must be measured in appropriate units e.g. minutes or seconds, not a combination of both.</p>																		
A clear trend	2 marks																										
Does not follow trend	1 mark																										
No results	0 marks																										

6	<p>Rate of curd formation calculated correctly;</p> <p>Graph has concentration of milk on x-axis and rate of curd formation or time taken for curd formation to occur on y-axis;</p> <p>Appropriate scales selected for both the x and y axis;</p> <p>Both axes correctly labelled with appropriate units;</p> <p>All points plotted accurately.</p> <p>Data presented as a line graph</p>	6	<p>These scales should allow for both accurate plotting and reading the graph.</p> <p>Concentration as percentage, rate as 1/time in seconds or per sec or s⁻¹. Accept 'Rate of reaction' or 'Time' as label for Y axis and 'Concentration' for X axis.</p> <p>Do not award this mark if curve has been extrapolated beyond 100 % but allow if extrapolated to zero.</p> <p>Accept either curve of best fit or points joined by straight lines.</p>
	Total	12	

EMPA Test Section A

Question	Marking Guidance	Mark	Comments
7(a)	So that milk was at 30°C/same temperature as water bath / equilibrate;	1	Accept 'to reach the right temperature'. Ignore optimum;
7(b)	Measure temperature (of milk/water); Add hot water/replace water in beaker; Insulate the water bath / described method; Tube placed in water bath between each rotation period;	2 max	
8	Use a buffer;	1	
9(a)(i)	<u>Rate</u> increases then remains constant; At 85% /at 0.0325;	2	Accept 'levels off', 'does not increase', 'reaches maximum' as alternatives to remains constant. If candidate provides figures from both x and y axis then both must be correct to award second mark point.
9(a)(ii)	1. Increase in concentration (of milk) provides more substrate/casein/protein; 2. (As rate increases/before 85%) limited by substrate; 3. More collisions(as substrate concentration increases); 4. (More) enzyme-substrate <u>complexes</u> / (more) substrate binds to <u>active site</u> ; 5. All <u>active sites</u> occupied/saturated (when rate constant); 6. Enzyme (concentration) limits rate / some other factor may be limiting;	4 max	Reject 'active sites used up' (point 5).

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9(b)	(Yes), as no data collected below 40%/ at low concentrations; OR (No), as I know that at origin/0,0 there is no curd formation;	1	
	Total	11	

EMPA Test Section B

Question	Marking Guidance	Mark	Comments
10	2 marks for Chymosin / enzyme is a protein; ; Protein/peptide bonds present;	2 max	
11	<u>Water</u> removed;	1	
12	(Rennet) has less/ variable amount of chymosin; Limited supply (of rennet) available; Pepsin may digest curd/protein / has another protein- digesting enzyme; (Animal) rennet unacceptable by vegetarians/vegans/against religious beliefs/ harms animals;	2 max	Accept use of figures e.g. 80-90% for first mark point.
13	Both contain <u>chymosin</u> / both derived from animal gene;	1	
14(a)	(Coagulation time) is reduced / is more active;	1	
14(b)	2 marks for correct answer of 27% / 27.3%;; 1 mark for incorrect answer in which candidate has shown fall in coagulation time as 3 (minutes) or 11 -8;	2 max	

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15	1. (Enzyme) denatured/loss of tertiary structure; 2. Hydrogen bonds broken; 3. Shape of <u>active site</u> changes / no longer complementary; 4. Less/no substrate binds / fewer/no enzyme-substrate complexes formed;	3 max	Accept 'ionic bonds' for second mark but reject peptide bonds. Disulfide bonds = neutral.
16	Nausea; Diarrhoea/ 'watery faeces'; Cramps / abdominal pains; Bloating/wind;	2 max	Do not accept vulgar terms. Accept 'stomach/intestinal pains' as alternative to abdominal pains. Vomiting = neutral.
17(a)	Assumed that did not eat due to discomfort in the past;	1	
17(b)	Positive correlation /as lactose concentration increases the data in column C increases/percentage who do not eat the food or feel discomfort after eating the food increases;	1	
17(c)	Correlation does not mean that there is a causal relationship; May be due to some other factor/example of factor;	2	Do not accept casual

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18	1. People self-diagnosed lactose intolerant condition; 2. Discomfort may be due to other factor/infection/other component of diet / is subjective; 3. Large variation in lactose content of specific food items/e.g. variation in lactose content of different soft cheeses; 4. Amount in a serving may vary; 5. Untruthful responses / demand characteristics;	2 max	Sample size = neutral.
	Total	20	