Biological Molecules

Mark Scheme 3

Level	IGCSE
Subject	Biology
Exam Board	CIE
Topic	Biological Molecules
Sub-Topic	
Paper Type	Alternative to Practical
Booklet	Mark Scheme 3

Time Allowed: **52 minutes**

Score: **/43**

Percentage: **/100**

1

1. separate sample for each test;
2. equal volume of each sample;
3. simple sugars :- Benedict's ;
    4. heat / boil; *ignore warm*
    5. stays blue is negative
    6. blue to green / yellow / orange / brown / red / AW;
7. protein:- biuret or sodium/potassium hydroxide + copper sulphate;
    8. blue to mauve / purple/violet;
9. repeat;
10. safety
    11. general safety point;

Accept *as alternative to points above*

3a clinistix;
6a pink to purple;
7a albustix;
8a yellow to green;

Reject colour changes if reagents totally wrong e.g. iodine / sodium chloride

Accept inaccurate spelling for name of test or reagents if recognisable
If not recognisable, but cannot be confused, then accept the colour change but not for test or reagent. [max 6]

[Total: 6]

2 **(a (i)** **O** axes correctly orientated; (*x*-axis pH and *y*–axis time + units)
A axes labelled + units; (time per min – is minimum, do not accept time/m as m = metres) (R PH when both letters are in capitals or ph both lower case)
S even scale; (plots to fill more than ½ of printed grid, + or – 1/2 square for P and L)
P plot 5 points correctly for student 2; (R 2 curves – if student 1 data has been plotted accept O and A not P– if curve for student 1 has been erased or crossed through accept for P mark)
L ruled line point to point; (R extrapolation/line of best fit / thick line
Accept freehand if smooth and through all points if there is no 'sagging' between points)

Bar chart/histogram points **O, A and P** only (for **A** look for pH value in centre of each column./for **P** look at heights) [5]

(ii) Number points on ticks
Description:
1. enzyme/optimum pH 8/reaction works faster/fastest/better at pH 8; (do not awa neutral pH 8 as incorrect)
2. relevant comment re. rates slowing/speeding up either side pH 8/optimum/enzy works fastest in alkaline range (this is a general point – to cover many different ways of expressing the idea of the curve)
3. correct use of figures from graph (other than pH 8); (use of one other figure + pH8 or use of two other figures – minimum)

Explanation:
4. denaturi (at extremes); (ignore if only refer to destroyed or damaged but look for mention of active site for point 5)
5. correct reference to active site being changed or distorted;
6. reference to causes of change in shape/contamination/inhibition/AW; [MAX. 5]

(b) (i) Number points on ticks
1. **enzyme** – concentration/amount/volume of enzyme different – even if more or less used/older versus freshly prepared enzyme;
2. **substrate** – different concentration/amount/type/volume of substrate/protein/film;
3. temperature is different;
4. presence of inhibitor/contamination/clean apparatus/AW;
   Ignore points about method/different end points in film clearing/agitation.
5. same pH/check pH; [MAX. 3]

(ii) Number points on ticks
1. **enzyme** – use of same volumes/conc./amount/same number of enzyme molecules;
2. **substrate** – use of same amount of protein/same film/same area/same thickness;
3. sam temperature;
4. increase in range of pH tested;
5. agitat the same;
6. repea experiment;
7. keep all variables the same (as alternative to points 1, 2 or 3);
   (this is a general point to cover all variables – if candidate has mentioned enzyme or substrate or temperature then these can score 3 marks separately – this marking point covers all variables and is not to be awarded with marking points 1 and 2 and 3.)
8. chec buffers/pH;
9. clea apparatus/AW;
   (ignore ref. to humidity and light)
   (ignore ref to diff enzymes, diff types trypsin) [MAX. 5]

[Total: 18]

3 **(a) (i)** Drawing of pod:
S larger size than Fig.1.2, ;
P accurate proportion;
O clear outline;

Label: pod (fruit);
nut (seed);
stalk (flowering); **[max: 5]**

(ii) length of drawing …… mm / cm
and length of Fig.1.2 mm / cm;
magnification x……..; **[3]**

(b) rise in temperature 50˚C **[1]**

(ii) 50 x 20 x 4.2 / 0.5 x 1000 ;
8 or 8.4 kJ g^{-1} ; **[2]**

(iii) graph B bar chart;
A axes labelled and units;
C columns – ruled + gaps between columns;
P plot completely accurate; **[4]**

(vi) fat; ec **[1]**

(c) grind in water;
add Benedicts solution(s);
heat;
colour change; **[max: 3]**

[total: 19]