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Detailed mark scheme

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2002

XVIII

1583

Time allowed
50 Minutes

Score

/42

Percentage

%

Biology

**AQA
AS & A LEVEL**

Mark Scheme

3.1 Biological molecules

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- 1 (Drink) contains carbohydrates / sugars **so** High GI / (drink) contains carbohydrates / sugars **so** raises blood glucose concentration quickly;

Each alternative requires both aspects for credit

The second alternative requires a reference to speed eg 'quickly' or 'immediately'

2. Contains salt so glucose more rapidly absorbed;
3. Increases glucose to muscles for respiration;
4. More / faster respiration so more / faster energy release;

Reject reference to energy production

Accept more ATP produced

[3]

- 2 (a) 1. Tertiary structure / 3D shape of enzyme (means);
Accept references to active site
2. Active site complementary to maltose / substrate / maltose fits into active site / active site and substrate fit like a lock and key;
Idea of shapes fitting together
3. Description of induced fit;
4. Enzyme is a catalyst / lowers activation energy / energy required for reaction;
Accept "provides alternative pathway for the reaction at a lower energy level"
5. By forming enzyme-substrate complex;
Accept idea that binding stresses the bonds so more easily broken
Do not award point 5 simply for any reference to E-S complex

5

- (b) 1. Inhibitors reduce binding of enzyme to substrate / prevent formation of ES complex;
Max 3 if only one type of inhibition dealt with. Accept maltase and maltose as examples of enzyme and substrate (and others)
Only once, for either inhibitor

(Competitive inhibition),

2. Inhibitor similar shape (idea) to substrate;
3. (Binds) in to active site (of enzyme);
Accept allows max rate of reaction to be reached / max product will eventually be formed
Accept complementary to active site
4. (Inhibition) can be overcome by more substrate;

(Non-competitive inhibition),

5. Inhibitor binds to site on enzyme other than active site;
6. Prevents formation of active site / changes (shape of) active site;
Accept does not allow max rate of reaction to be reached / max product will not be formed
7. Cannot be overcome by adding more substrate;

5 max

[10]



- 3 (a) 1. Maltose;
2. Salivary amylase breaks down starch. 2
- (b) Maltase. 1
- (c) (Mimics / reproduces) effect of stomach. 1
- (d) 1. Add boiled saliva;
2. Everything same as experiment but salivary amylase denatured. 2
- (e) 1. Some starch already digested when chewing / in mouth;
2. Faster digestion of chewed starch;
3. Same amount of digestion without chewing at end.
Accept use of values from graph 3

[9]



- 4 (a) 1. Starch formed from α -glucose but cellulose formed from β -glucose;
2. Position of hydrogen and hydroxyl groups on carbon atom 1 inverted.

2

- (b) 1. Insoluble;
2. Don't affect water potential;
OR
3. Helical;

Accept form spirals

4. Compact;
OR
5. Large molecule;
6. Cannot leave cell.

2

- (c) 1. Long and straight chains;
2. Become linked together by many hydrogen bonds to form fibrils;
3. Provide strength (to cell wall).

3

[7]



5 (a) (i) **(Both)**

1. Are polymers / polysaccharides / are made of monomers / of monosaccharides;
2. Contain glucose / carbon, hydrogen and oxygen;
3. Contain glycosidic bonds;
4. Have 1–4 links;

Neutral: references to 'unbranched', insoluble, formed by condensation, flexible and rigid

Are made of the monomer glucose = MP 1 and 2 = 2 marks

5. Hydrogen bonding (within structure).

Ignore reference to H bonds between cellulose molecules

2 max

(ii) (Starch)

1. Contains α / alpha glucose;



Assume 'it' refers to starch

Accept: converse arguments only if linked directly to cellulose

Accept: forms α glycosidic bonds

2. Helical / coiled / compact / branched / not straight;
3. 1,6 bonds / 1,6 branching;
4. Glucoses / monomers same way up;
5. No H-bonds between molecules;
6. No (micro / macro) fibres / fibrils.

2 max

- (b) (i) 1. No / few organelles / very little cytoplasm / cytoplasm at edge / more room / hollow / large vacuole / large space / thick walls;
Accept strong walls for thick walls
2. (So) easier / more flow / (thick / strong walls) resist pressure.
Easier flow may be expressed in other ways e.g. lower resistance to flow

2

- (ii) 1. Mitochondria release energy / ATP / site of respiration;
Q Reject: 'produce energy'
but accept produce energy in form of ATP
2. For active transport / uptake against concentration gradient.
Note: no mark is awarded for simply naming an organelle
- OR:**
3. Ribosomes / rough endoplasmic reticulum produce(s) proteins;
Concept of making proteins needed
4. (Proteins) linked to transport e.g. carrier proteins / enzymes.

2

[8]



6 (a) Accept **three** suitable suggestions:

1. (Lactase / beads) can be reused / not washed away;
1. Accept lactase / beads not wasted
1. Less lactase used is insufficient
2. No need to remove from milk;
2. Accept lactase not present in milk.
3. Allows continuous process;
4. The enzyme is more stable;
5. Avoid end-product inhibition.
Ignore ref to SA

3 max

- (b)
1. (Lactose hydrolysed to) galactose and glucose;
 2. (So) more sugar molecules;
*2. Idea of **more** sugars essential*
 3. (So) more / different receptors stimulated / sugars produced are sweeter (than lactose).

2 max

[5]