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# BIOLOGY

## BIOLOGICAL MOLECULES

| | |
|---|---|
| **LEVEL & BOARD:** | AQA (A - LEVEL) |
| **TOPIC:** | Carbohydrate |
| **PAPER TYPE:** | Solution 2 |
| **TOTAL QUESTIONS:** | 04 |
| **TOTAL MARKS:** | 41 |

# Carbohydrate - 2

1.

(a)

| Cellulose | Glycogen |
|---|---|
| Cellulose is made up of β-glucose | Glycogen is made up of α-glucose |
| Cellulose molecule has straight chain | glycogen is branched |
| Cellulose molecule has straight chain | glycogen is coiled |
| glycogen has 1,4- and 1,6- glycosidic bonds | cellulose has only 1,4- glycosidic bonds |

(b) Starch is an ideal storage molecule because:

- it is insoluble and therefore doesn't affect the water potential of the cell
- it is large and therefore cannot diffuse from the cell
- it is compact and therefore much can be stored in a small space
- it is branched and has many ends and therefore can be hydrolysed rapidly by many enzymes at the same time
- it releases alpha-glucose when hydrolysed - this is easily transported and can be directly respired

(c) Iodine/potassium iodide

2.

(a) Glycogen is an alpha glucose polymer where most of the alpha glucose molecules are joined by 1,4 glycosidic bonds. Glycogen contains branches.

(b) When the body needs a quick boost of energy or when the body isn't getting glucose from food, glycogen is broken down to release glucose into the bloodstream to be used as fuel for the cells

3.

**(a)** Maltose is a disaccharide made up of two glucose molecules

**(b)** Maltose is composed of two molecules of glucose joined by an α-1,4-glycosidic linkage.

**(c)**

| Concentration of maltose solution mol $dm^{-3}$ | Volume of 0.6 mol $dm^{-3}$ maltose solution / $cm^3$ | volume of water / cm3 |
|---|---|---|
| 0.2 | 5 | 10 |

**(d)**

- draw a lob f
- read off the graph from 0.45 au to determine unknown maltose concentration

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.

**(b)** Starch is an ideal storage molecule because it is insoluble and therefore doesn't affect the water potential of the cell
It is large and therefore cannot diffuse from the cell

It is compact and therefore much can be stored in a small space

It is branched and has many ends and therefore can be hydrolysed rapidly by many enzymes at the same time

(c)

- Cellulose molecule has long and straight chains
- It became linked together by many hydrogen bonds to form fibrils;
- It provides strength (to cell wall).

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