AQA Biology A-level

1.1 - Monomers and polymers

1.2 - Carbohydrates

Flashcards

Define monomer. Give some examples.

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smaller units that join together to form larger molecules

- monosaccharides (glucose, fructose, galactose)
- amino acids
- nucleotides

Define polymer. Give some examples.

Define polymer. Give some examples.

molecules formed when many monomers join together

- polysaccharides
- proteins
- DNA / RNA

What happens in a condensation reaction?

What happens in a condensation reaction?

A chemical bond forms between 2 molecules & a molecule of water is produced.

What happens in a hydrolysis reaction?

What happens in a hydrolysis reaction?

A water molecule is used to break a chemical bond between 2 molecules.

Name the 3 hexose monosaccharides.

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- glucose
- fructose
- galactose

all have the molecular formula $C_6H_{12}O_6$

Name the type of bond formed when monosaccharides react.

Name the type of bond formed when monosaccharides react.

(1,4 or 1,6) glycosidic bond

2 monomers = 1 chemical bond = **disaccharide**

multiple monomers = many chemical bonds = **polysaccharide**

Name 3 disaccharides. Describe how they form.

Name 3 disaccharides. Describe how they form.

condensation reaction forms glycosidic bond between 2 monosaccharides

- **maltose**: glucose + glucose
- **sucrose**: glucose + fructose
- **lactose**: glucose + galactose

all have molecular formula $C_{12}H_{22}O_{11}$

Draw the structure of α-glucose.

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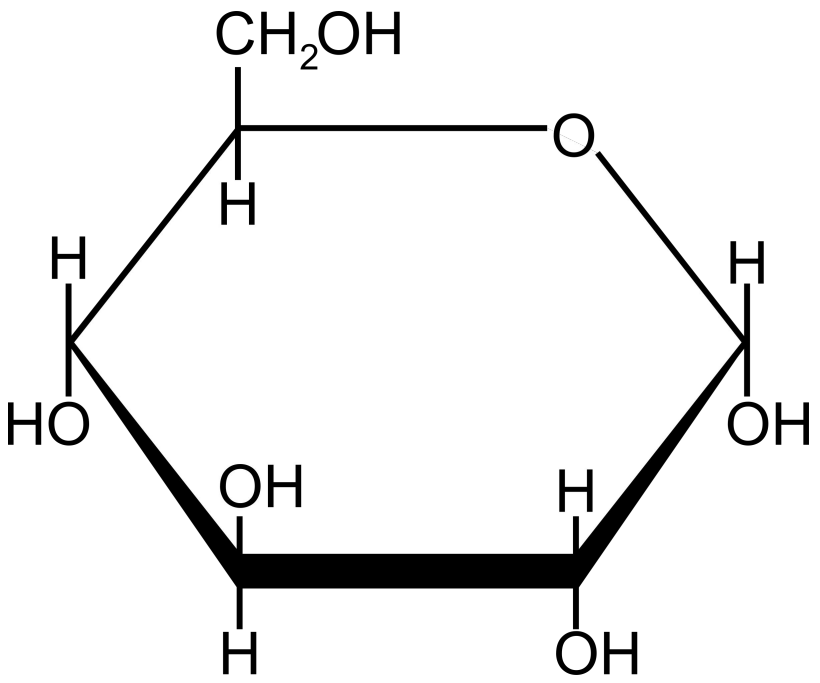

Draw the structure of β-glucose.

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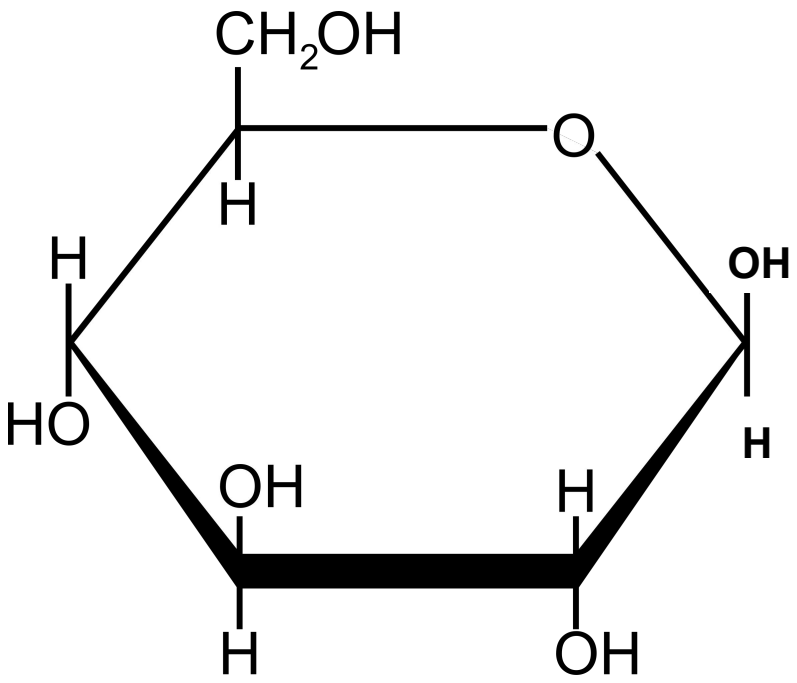

Describe the structure and functions of starch.

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storage polymer of α-glucose in plant cells

- insoluble = no osmotic effect on cells
- large = does not diffuse out of cells

made from **amylose**:

- 1,4 glycosidic bonds
- helix with intermolecular H-bonds = compact

and **amylopectin**:

- 1,4 & 1,6 glycosidic bonds
- branched = many terminal ends for hydrolysis into glucose

Describe the structure and functions of glycogen.

Describe the structure and functions of glycogen.

main storage polymer of α-glucose in animal cells

(but also found in plant cells)

- 1,4 & 1,6 glycosidic bonds
- branched = many terminal ends for hydrolysis
- insoluble = no osmotic effect & does not diffuse out of cells
- compact

Describe the structure and functions of cellulose.

Describe the structure and functions of cellulose.

polymer of β-glucose gives rigidity to plant cell walls (prevents bursting under turgor pressure, holds stem up)

- 1,4 glycosidic bonds
- straight-chain, unbranched molecule
- alternate glucose molecules are rotated 180°
- H-bond crosslinks between parallel strands form microfibrils = high tensile strength

Describe the Benedict's test for reducing sugars.

Describe the Benedict's test for reducing sugars.

1. Add an equal volume of Benedict's reagent to a sample.
2. Heat the mixture in an electric water bath at 100℃ for 5 mins.
3. Positive result: colour change from blue to orange & brick-red precipitate forms.

Describe the Benedict's test for non-reducing sugars.

Describe the Benedict's test for non-reducing sugars.

1. Negative result: Benedict's reagent remains blue
2. Hydrolyse non-reducing sugars e.g. sucrose into their monomers by adding 1cm^3 of HCl. Heat in a boiling water bath for 5 mins.
3. Neutralise the mixture using sodium carbonate solution.
4. Proceed with the Benedict's test as usual.

Describe the test for starch.

Describe the test for starch.

1. Add iodine solution.
2. Positive result: colour change from orange to blue-black.

Outline how colorimetry could be used to give qualitative results for the presence of sugars and starch.

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1. Make standard solutions with known concentrations. Record absorbance or % transmission values.
2. Plot calibration curve: absorbance or % transmission (y-axis), concentration (x-axis).
3. Record absorbance or % transmission values of unknown samples. Use calibration curve to read off concentration.