

Edexcel (B) Biology A-level

1.1 - Carbohydrates

1.2 - Lipids

Flashcards

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Define monosaccharide. Name the 3 hexose monosaccharides.



Define monosaccharide. Name the 3 hexose monosaccharides.

organic monomer that cannot be hydrolysed to a simpler sugar

- glucose
- fructose
- galactose

molecular formula $C_6H_{12}O_6$

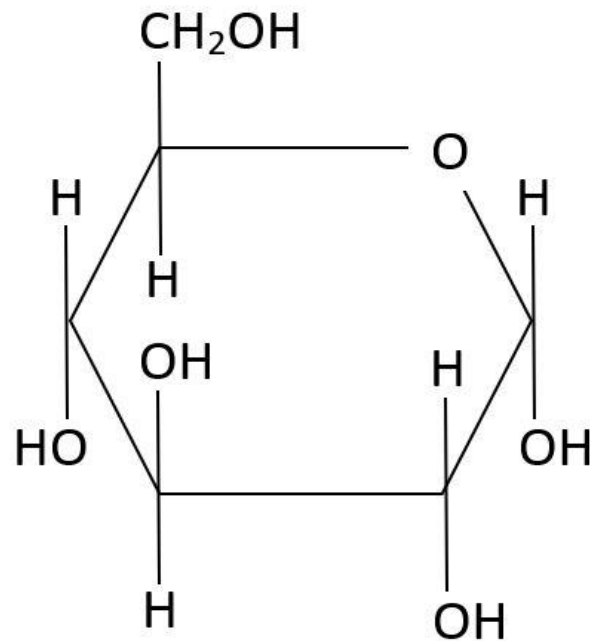


Draw the structure of α -glucose.



Draw the
structure of
 α -glucose.

cis isomer

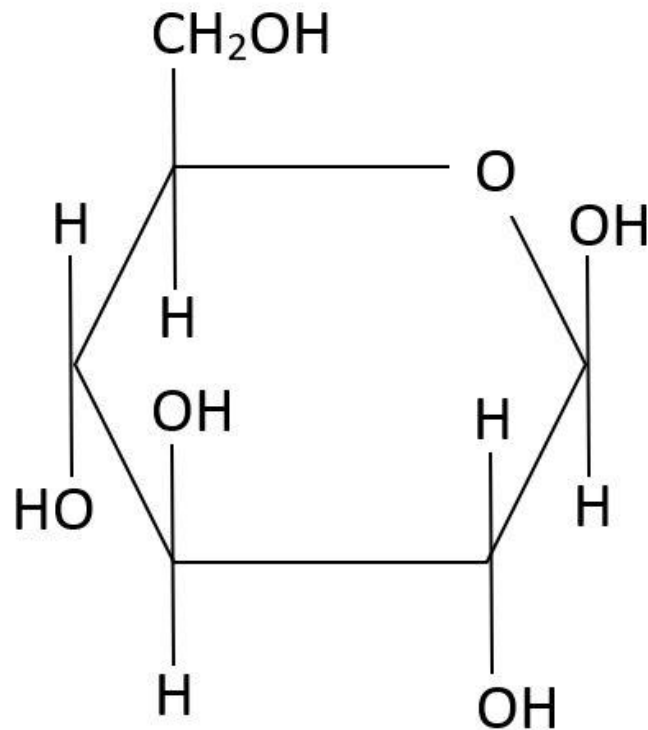


Draw the structure of β -glucose.



Draw the
structure of
 β -glucose.

trans isomer



Relate the structure of glucose to its functions.



Relate the structure of glucose to its functions.

(α -glucose)

- Small & water soluble = easily transported in bloodstream.
- Complementary shape to antiport for co-transport for absorption in gut.
- Complementary shape to enzymes for glycolysis = respiratory substrate.

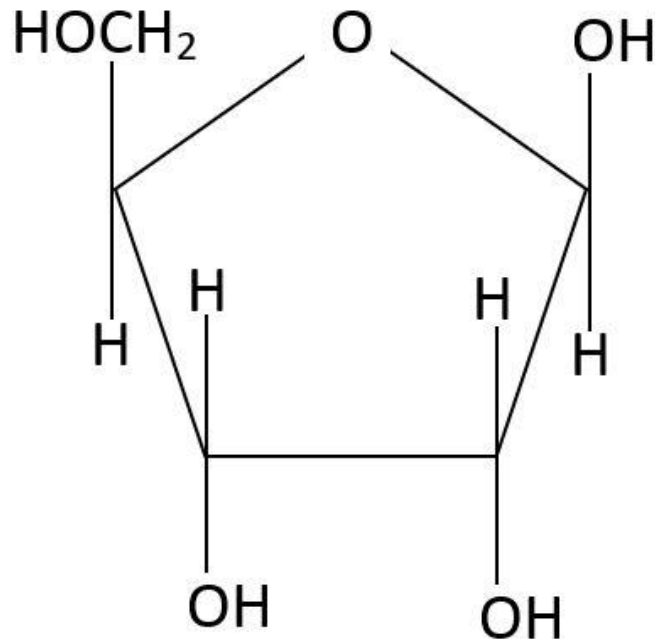


Draw the structure of ribose.



Draw the structure of ribose.

pentose
monosaccharide



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.



What type of bond forms when monosaccharides react?



What type of bond forms 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 $C_{12}H_{22}O_{11}$



Define polysaccharide. Give 3 examples.



Define polysaccharide. Give 3 examples.

Polymer made from a repeating monosaccharide unit:

- starch
- glycogen
- cellulose



Describe the structure and functions of starch.



Describe the structure and functions of starch.

Storage polymer of α -glucose in plant cells.

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

made from **amylose**:

and **amylopectin**:

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



How do triglycerides form?



How do triglycerides form?

condensation reaction between 1 molecule of **glycerol** & **3 fatty acids** forms **ester bonds**

Three fatty acid chains are bound to glycerol by dehydration synthesis.

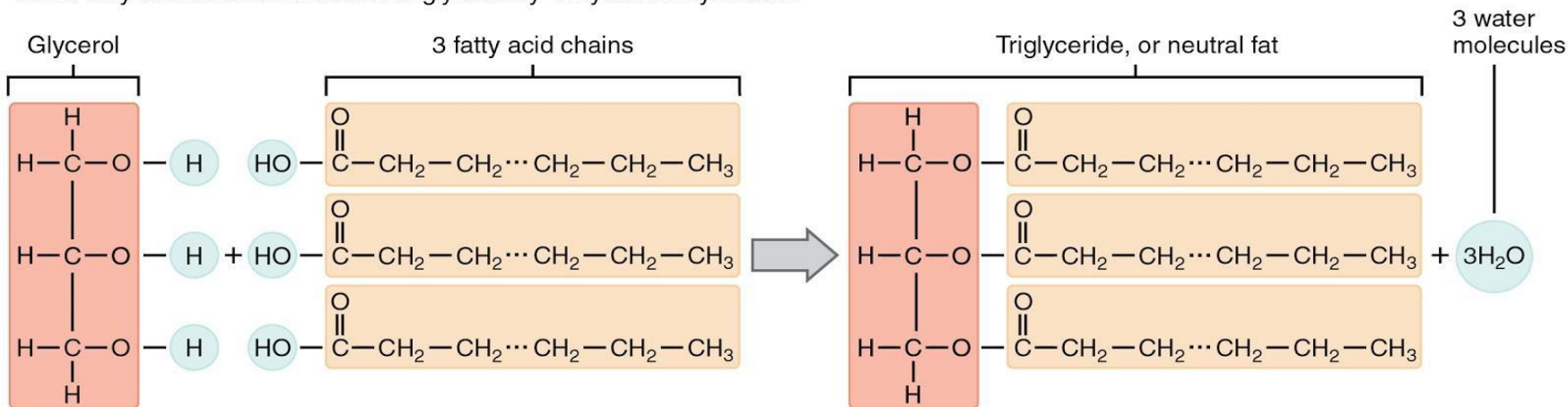


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Contrast saturated and unsaturated fatty acids.



Contrast saturated and unsaturated fatty acids.

Saturated:

- contain only single bonds
- straight-chain molecules have many contact points
- higher melting point = solid at room temperature
- found in animal fats

Unsaturated:

- contain C=C double bonds
- 'kinked' molecules have fewer contact points
- lower melting point = liquid at room temperature
- found in plant oils



Relate the structure of triglycerides to their functions.



Relate the structure of triglycerides to their functions.

- High energy:mass ratio = **high calorific value** from oxidation (energy storage).
- Insoluble hydrocarbon chain = no effect on water potential of cells & used for **waterproofing**.
- Slow conductor of heat = **thermal insulation** e.g. adipose tissue.
- Less dense than water = **buoyancy** of aquatic animals.



Describe the structure and function of phospholipids.



Describe the structure and function of phospholipids.

Amphipathic: **glycerol** backbone attached to **2 hydrophobic fatty acid tails** & **1 hydrophilic polar phosphate head**.

- forms phospholipid **bilayer** in water = component of membranes
- tails can splay outwards = waterproofing

