

Exercise walk-through

2.2

Carbohydrates and lipids

A-Level Biology

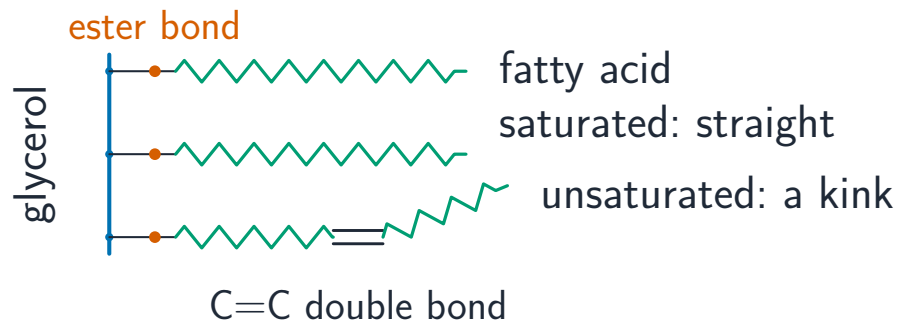
Triglycerides

A **triglyceride** : one **glycerol** + three **fatty acids** by **ester bonds** .

■ **saturated** – no double bonds (solid)

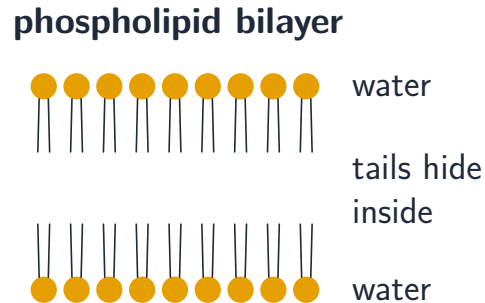
■ **unsaturated** – kinked (liquid)

A rich energy store – twice the energy per gram.



3 ester bonds form $\rightarrow$ 3 H_2O removed (condensation)

Phospholipids



A **phospholipid** has a **hydrophilic** **phosphate** head and two **hydrophobic** tails.

Heads face the water, tails hide inside – forming the **bi-layer** of every cell membrane.

Exercises 2.1·2.2

2.1 Name the bond formed when (a) two monosaccharides join, and (b) a fatty acid joins glycerol. [2]

2.2 State **two** ways the structure of starch suits its function as an energy store. [2]

Exercises 2.1-2.2

2.1 Name the bond formed when (a) two monosaccharides join, and (b) a fatty acid joins glycerol. [2]

2.1

(a)

- glycosidic bond

(b)

- ester bond

2.2 State **two** ways the structure of starch suits its function as an energy store. [2]

2.2

- Any two: compact / insoluble (does not leave the cell or affect water potential) / branched so many ends for fast hydrolysis / large molecule

Exercises 2.3·3.1

2.3 Explain why cellulose is strong enough to support a plant cell wall.

[3]

3.1 Which statement about α -glucose and β -glucose is correct?

[1]

☐

A they are different elements

B they differ in the position of an -OH group on carbon 1

C β -glucose cannot form a ring

D only α -glucose is a reducing sugar

Exercises 2.3·3.1

2.3 Explain why cellulose is strong enough to support a plant cell wall. [3]

2.3

- β -glucose means every other glucose is flipped, so chains are long and straight; many straight chains lie side by side, held by hydrogen bonds into strong microfibrils

3.1 Which statement about α -glucose and β -glucose is correct? [1]

☐

A they are different elements

B they differ in the position of an -OH group on carbon 1

C β -glucose cannot form a ring

D only α -glucose is a reducing sugar

3.1 B

- They differ only in the position of the -OH on carbon 1

Exercises 3.2-3.3

3.2 How many water molecules are released when one glycerol joins three fatty acids to form a triglyceride? [1]

☐

A 1

B 2

C 3

D 6

3.3 Which polysaccharide is made of β -glucose and forms straight chains? [1]

☐

A amylopectin

B amylose

C cellulose

D glycogen

Exercises 3.2-3.3

3.2 How many water molecules are released when one glycerol joins three fatty acids to form a triglyceride? [1]

☐

- A 1
- B 2
- C 3
- D 6

3.2 C

- Three ester bonds form, so three water molecules are released

3.3 Which polysaccharide is made of β -glucose and forms straight chains? [1]

☐

- A amylopectin
- B amylose
- C cellulose
- D glycogen

3.3 C

- Cellulose is made of β -glucose and forms straight chains

Exercise 3.4

3.4 (a) Describe how a glycosidic bond is formed between two glucose molecules. [2]

(b) Glycogen and cellulose are both polymers of glucose, but have very different functions. Explain how their structures relate to their functions. [4]

Exercise 3.4

3.4 (a) Describe how a glycosidic bond is formed between two glucose molecules. [2]

(b) Glycogen and cellulose are both polymers of glucose, but have very different functions. Explain how their structures relate to their functions. [4]

3.4

(a)

- a glycosidic bond forms by condensation, removing one water molecule

(b)

- glycogen is highly branched, giving many ends for fast hydrolysis to release glucose for respiration; cellulose is straight β -glucose chains held side by side by hydrogen bonds into strong fibres that support the cell wall

Exercise 3.5

3.5 Explain why a triglyceride is a good long-term energy store.

[2]

Exercise 3.5

3.5 Explain why a triglyceride is a good long-term energy store. [2]

3.5

- insoluble / does not affect water potential; releases about twice the energy per gram of carbohydrate