CHEMISTRY ONLINE
TUITION

Phone: +442081445350

www.chemistryonlinetuition.com

Email:asherrana@chemistryonlinetuition.com

BIOLOGY

FOUNDATIONS IN BIOLOGY

Level & Board	OCR (A-LEVEL)
TOPIC:	BIOLOGICAL MOLECULES - CARBOHYDRATES
PAPER TYPE:	SOLUTION - 2
TOTAL QUESTIONS	8
TOTAL MARKS	/33

Biological Molecules – Carbohydrates - 2

1.

(a) In animal cells, glucose is generally stored in the form of glycogen. This is done to not upset the osmotic balances in the cell. Glucose molecules are soluble in water and thus can cause the cell to become hypertonic. This will result in the entry of water molecules within the cells and cause it to lyse.

OR

Glycogen is

Insoluble, so has no effect on, water potential / Ψ of cell

Metabolically inactive

Compact / lots can be stored in a small space

Able to store large amounts / lots of energy

Highly branched so has lots of ends for, adding / removing, glucose when needed

2.

(a)

Two, 6-membered rings / hexoses

1-4 glycosidic bond

Two CH2OH groups

Rings contain one, oxygen atom / O

(b)

Lactose	**Maltose**
contains beta /β-glucose	Contains alpha / α-glucose
β-glycosidic bond	α-glycosidic bond
sugars in opposing orientation / flipped/ AW	Both monomers in same direction / AW

3.

(a)

Bonds contain energy bonds can be broken by respiratory enzymes

Soluble so, can move within cell

H / OH, (groups) can form H bonds with water / allow solubility

AVP

OR

Too big

Unable to pass between phospholipids

(b) Lactose is too large to pass spontaneously through biological membranes and, after its synthesis, is trapped in the lumen of the Golgi.

(c)

Mammal diet high in milk so high lactose concentration

Structural gene for protein channel/lactose permeate is transcribed/expressed

Protein is lactose permease.

4.

(a)

High tensile strength

Insoluble

Flexible

5.

(a)

Similarities:

Polymers / polysaccharides

Have, 6 carbon / C6, sugars

Have 1-4 glycosidic bonds

Have CH_2OH side group in monomers

Differences:

Chitin has β-glycosidic bonds

Chitin contains, nitrogen / N / amide / $NH\text{-}CO\text{-}CH_3$

No 1-6 glycosidic bonds in chitin

No branching in chitin

6.

(a) soluble / polar

(b)

Glycogen compared to amylopectin

More branched

More coiled

so is more compact / less space needed for storage

branching gives many / more, free ends

Where glucose can be added or removed

So speeds up glucose, release / hydrolysis

(c)

OH / H group on C1 is in opposite position to beta glucose

OR

In alpha glucose -H is at top and -OH is at bottom on C1

7.

(a) diagram completed to show correct position of all 5 carbon atoms in a pentose

8.

(a)

Cellulose

Has 1-3 and 1-6 glycosidic bonds

Is branched

Is helical

Idea of alternate glucose molecules are not rotated 180°

DR. ASHAR RANA

CHEMISTRY ONLINE
TUITION

Phone: +442081445350
www.chemistryonlinetuition.com
Email: asherrana@chemistryonlinetuition.com

- Founder & CEO of Chemistry Online Tuition Ltd.
- Tutoring students in UK and worldwide since 2008
- Chemistry, Physics, and Math's Tutor

CONTACT INFORMATION FOR
CHEMISTRY ONLINE TUITION

- UK Contact: 02081445350
- International Phone/WhatsApp: 00442081445350
- Website: www.chemistryonlinetuition.com
- Email: asherrana@chemistryonlinetuition.com
- Address: 210-Old Brompton Road, London SW5 OBS, UK