



CHEMISTRY ONLINE
— **TUITION** —

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BIOLOGY

ORGANISMS EXCHANGE SUBSTANCES

Level & Board	AQA (A-LEVEL)
TOPIC:	DIGESTION & ABSORPTION
PAPER TYPE:	SOLUTION - 1
TOTAL QUESTIONS	6
TOTAL MARKS	41

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Digestion and Absorption - 1

1.

(a) The intestinal cells absorb the fats. Long-chain fatty acids form a large lipoprotein structure called a chylomicron that transports fats through the lymph system. Chylomicrons are formed in the intestinal cells and carry lipids from the digestive tract into circulation.

OR

- Micelles contain bile salts and fatty acids/monoglycerides
- Bring fatty acids/monoglycerides to the lining of the ileum
- Fatty acids/monoglycerides absorbed by diffusion
- Triglycerides reformed in cells
- Vesicles move to cell membrane

2.

(a)

- Carrier protein X is a sodium potassium pump
- In order to transport 3 sodium ions out of the cell, a molecule must bind to the pump.
- The hydrolysis of the ATP molecule provides the energy to change the shape of the channel and allows the sodium ions to move through against concentration gradient
- ATP hydrolase catalyses the hydrolysis of the ATP molecule (from ATP to ADP + Pi)

(b)

- Sodium ions are actively transported out of the ileum epithelial cells into the blood by a sodium-potassium pump. (counter transport)
- Creates a concentration gradient (high in the bloodstream and low in the epithelial cells)
- Conc gradient causes sodium ions to diffuse from the lumen of the ileum into the epithelial cell, down a conc. grad, via sodium-glucose co-transporter proteins.
- Co-transporter carries glucose into the cell with the sodium, and this conc. of glucose is increased in the cell

- Glucose is moved by indirect active transport by the co-transport cell against its conc gradient

3.

(a)

Triglycerides decrease due to the actions of the LIPASE

Fatty acids increase due to hydrolysis of triglycerides

(b) To denature the enzymes So, no further hydrolysis occurred

(c) The micelles are water soluble and enable the lipid digestion products to be transported to the small intestinal surface for absorption. At the site of absorption, the micelle breaks down and the bile salt returns to the intestine for continuing emulsification processes (bile salt recycling).

OR

- Micelles include bile salts & fatty acids
- They make the fatty acids more soluble
- Carry fatty acids to the lining of the ileum
- Maintain a higher concentration of fatty acids in cell
- Fatty acids absorbed by diffusion

4.

(a) Once a protein source reaches your stomach, hydrochloric acid and enzymes called proteases break it down into smaller chains of amino acids. Amino acids are joined together by peptides, which are broken by proteases.

OR

- Enzymes hydrolyze peptide bonds in proteins
- Endopeptidases acts in the middle of protein- produces shorter polypeptides
- Exopeptidases act at end of protein- produces dipeptides
- Dipeptidase produces single amino acids by acting on a dipeptide

(b)

- No significant difference in protein absorption because ± 2 SD's overlap
- So mean percentage absorbed is not affected by percentage in the diet
- Amount of protein in the diet is not the limiting factor

(c)

- Undigested protein broken down
- So more amino acids absorbed
- Because protein passes again through ileum

5.

(a) Diffusion

(b)

- Droplets increase surface areas
- Faster hydrolysis / digestion
- Micelles carry fatty acids and monoglycerides to epithelial cell

(c)

Golgi apparatus

- Modifies triglycerides
- Combines triglycerides with proteins
- Packages for exocytosis

6.

(a) The cells lining the ileum of mammals absorb the monosaccharide glucose by co-transporting it with sodium ions. This process is known as secondary active transport. Glucose and sodium ions bind simultaneously to the same symport proteins on the apical surface of the cell.

OR

Sodium is actively transported from the ileum cell into blood. This maintains a gradient for sodium to enter with glucose, Glucose is then able to enter by facilitated diffusion with sodium ions.

(b)

Biochemical test	Liquid from beaker	Liquid inside Visking tubing
Biuret reagent		✓
I ₂ /KI		✓ or blank
Benedict's	✓	✓

(c)

- **Biuret:** protein molecules too large to pass through tubing
- Iodine in potassium iodide solution: starch molecules too large to pass through tubing
- **Benedict's:** starch hydrolyzed to maltose, which is able to pass through tubing.

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I am Sorry !!!!!



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- Founder & CEO of Chemistry Online Tuition Ltd.
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