



ASSESSMENT and  
QUALIFICATIONS  
ALLIANCE

# Mark scheme January 2002

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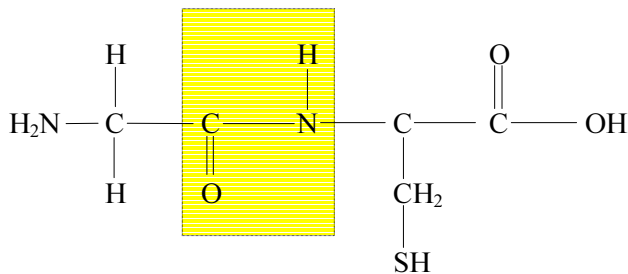
## GCE

### Biology B

### Unit BYB1

**Question 1**

- (a) Biuret reagent / Add NaOH and CuSO<sub>4</sub>; (*ignore heated*)  
Positive result = violet/mauve/lilac/purple coloration; (*NOT blue*) 2
- (b) (i) Nitrogen / N; (*NOT N<sub>2</sub>*) 1
- (ii) Condensation; 1
- (iii) *Must have box correct (allow HN / NH, but must have C=O correct)*



Total 5

**Question 2**

- (a) (i) X 6.2; 1
- (ii) Active transport / active uptake; 1
- (b) Ref. to carrier/intrinsic/pore/gate/transport/pump proteins;  
Ref. to different numbers of carrier proteins;  
Ref. to specificity / different types of carrier proteins;  
Ref. to charge / size of ion; 2 max
- (c) For respiration;  
Energy for active transport; 1 max

Total 5

**Question 3**

- (a) A = Epithelium (*ignore type of epithelium*) / Endothelium; 1
- (b) Muscle; 1
- (c) (i) X = Mitochondria;  
Y = Microvilli / brush border; 2
- (ii) X = Provide energy/for active uptake;  
Y = Increase surface area; 2

Total 6

**Question 4**

- (a) 82% 1
- (b) Concentration gradient maintained over whole lamella;  
Diffusion gradient maintained / oxygen taken up over whole lamella;  
Equilibrium never reached; 2 max
- (c)
- |   |  |   |
|---|--|---|
| ✓ |  |   |
|   |  | ✓ |
| ✓ |  |   |
- 2
- Remove one mark for each incorrect tick to minimum mark of zero*
- (d) Decreases surface area;  
(Thick wall) slows down diffusion rate / increases diffusion pathway; (*NOT less diffusion*)  
Mask increases concentration gradient / difference; 3
- Total 8

**Question 5**

- (a) Faster gas exchange / diffusion;  
Large / big / increased surface area / shorter pathway for gas exchange / Hb not too far from membrane;  
(*NOT more / bigger / greater / easier / more efficient*)  
OR  
Increases flexibility;  
To pass through capillaries; 2
- (b) Protein synthesis / Cell division / Mitosis; (*NOT Meiosis*) 1
- (c) (i) Monolayer;  
Tails up / heads in water; 2  
(*NOT completely submerged or floating in air*)
- (ii) 0.5 / ½;  
Phospholipids are arranged in a bilayer; 2
- Total 7

**Question 6**

- (a) Osmosis transports water;  
Proteins / carrier molecules not used / occurs through phospholipid bilayer; 2
- (b) Jam has a lower (more –ve) water potential than the bacterial cytoplasm;  
Water leaves the bacteria;  
Effect (of water loss) on bacteria e.g. killed / chemical reactions cannot occur; 3
- Total 5

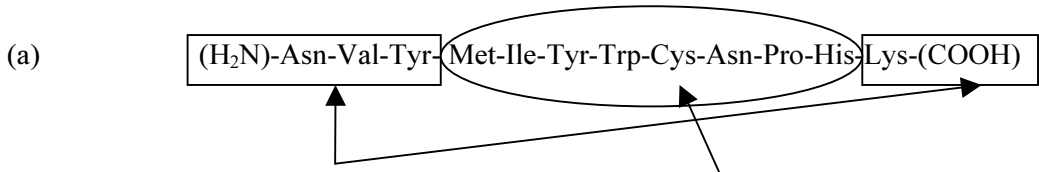
**Question 7**

- (a) Active site; 1
- (b) Substrate enters active site;  
Complimentary shapes / Lock and Key;  
(Binding) to form enzyme-substrate complex;  
Lowering of activation energy;  
Conformational / shape change;  
Breaking of bonds in substrate;  
Products no longer fit active site and so are released; 4
- (c) **Molecule A** binds at site away from active site / allosteric site;  
Causes enzyme / active site to change shape;  
**Molecule B** can enter / competes for active site;  
Prevents substrate from entering / no enzyme-substrate complex formed / active site blocked; 4
- (d) (i) Secretes enzymes (for extra-cellular digestion);  
Absorbs products; 2
- (ii) Optimum pH is 7 / neutral / between 6 and 8 / between 7 and 8; 1
- (iii) Max rate =  $\frac{\text{Distance}}{\text{Time}} / \frac{11}{4} / \frac{11}{4 \times 60}$  ; 2

[Correct answer = 2 marks (*IGNORE units*)  
e.g. 2.75 mm / hour, 0.046 mm/min,  $4.6 \times 10^{-3}$  mm/min  
1 mm/ 21.8 mins, 23.76mm<sup>2</sup>/hour]

Total 14

**Question 8**



*Both correct = 1 mark ; Correct = second mark;* 2

(b) **B;**  
 Fragment 3 is the second biggest molecule and so will travel second least distance; 2

(c)  $R_f = \frac{\text{Distance travelled by spot}}{\text{Distance travelled by front}} ; \frac{79 \text{ mm}}{129 \text{ mm}} \text{ to } \frac{82 \text{ mm}}{129 \text{ mm}} = \frac{0.61 - 0.64}{1}$  2

*MUST be 2DP*  
*Correct answer = 2 marks*

(d) (i) **A;**  
 As there are two molecules composed of 5 aa / the same size / contains fragments 2 and 5; 2

(ii) Use 2 way/2D chromatography / Rotate chromatogram 90°;  
 Use a different solvent; 2

(e) Long chains of aa; }  
 Folding of chain into a coil / folds / helix / pleated sheet; } 1

Association of several polypeptide chains together; }  
 Formation of fibres / sheets explained; } 2

H bonds / Disulphide bonding (*In context*);  
Fibres provide strength (and flexibility);  
Sheets provide flexibility;  
 Example e.g. keratin in hair, collagen in bone; (*MUST be in context*)  
 Insoluble because external R-groups are non-polar;

5  
 Total 15