RECOGNISING ACHIEVEMENT

# Subject: ...BIOCHEMISTRY. Code: 2815/02 .....

## Session: January.... Year: 2003.....

## Mark Scheme
## post exam 16Feb 2003

| MAXIMUM MARK | 45 |
|---|---|

| | | | |
|---|---|---|---|
| 1 | (a) | Active site ✓ saturated with substrate✓ AW | 2 |
| | (b) | Curve is less steep✓ and flattens to maximum at lower activity✓ | 2 |
| | | Question total | 4 |
| | | PAPER TOTAL | 45 |

| | | |
|---|---|---|
| 3 (a) (i) | Any COO group or OPO group ✓ Accept $-CH_2OCO-$ | 1 |
| (ii) | Central C on glycerol ✓ and C2 in serine ✓ | 2 |
| (iii | -1 ✓ | 1 |
| (b) | Picture showing bilayer ✓ two hydrocarbon chains each inside ✓<br>Micelle scores one ✓ only | 2 |
| (c)(i) | $-NH_3+$ ✓ $-COO-$ ✓ | 2 |
| (ii) | Ionic attraction ✓ between charged side-chains on protein and charges on surface of membrane ✓/<br>hydrogen bonding✓ between suitable groups on protein and surface<br>eg NH and $CH_2OH$ ✓ | 2 |
| (iii) | Converts $^+NH_3$ to $NH_2$ /changes ionisation status/charges ✓<br>( not COOH becomes $COO^-$)<br>Reducing ionic attractions ✓ | 2 |
| | Question total | 12 |

4

Look for 8 points from the following . Several can be earned by accurate diagrams. AW throughout.

glycosidic links ✓
In starch links are α 1-4 ✓ ( and α1–6 in amylopectin ✓)
Amylopectin branched ✓
In cellulose links are β 1-4 ✓
It must be clear that they understand α and β .

Resulting helical/coils ✓ in amylose
Starch allows ready hydrolysis ✓ to glucose, for energy/ATP production ✓
Starch is insoluble (reason not required)✓ and does not affect the osmotic prssure within a cell.✓

Parallel strands✓connected by hydrogen bonds ✓ in cellulose
Therefore fibrous ✓ to provide strength ✓ for plant cell walls — 8

QWC Look for at least two complete sentences with fewer than three SPG errors. — 1

Question total — 9

2 (a) 284 ($gmol^{-1}$) 1

(b) Glucose -2800/182 = -15.4$kJg^{-1}$ ✓ Accept the correct -15.6 $kJg^{-1}$.
Stearic acid -11080/284 = -39.0$kJg^{-1}$ ecf ✓ accept bare answers and two or more sig figs. Must be some evidence of negative signs. 2

(c) Energy produced by formation ✓ of O to H and ✓ C to O bonds

In glucose many of these are formed already ✓

OR glucose is more oxidised than stearic acid ✓ plus further comment on oxidation of $CH_2$ releasing more energy than that of CHOH.✓ AW 3

Question total 6

5 (a)(i) Presence of U not T 1

(ii) Any two ✓✓ of DNA uses deoxyribose not ribose
RNA molecules smaller
DNA usually double helical
DNA is found only in nucleus 2

(b) - Phe-Pro-Lys-Gly- ✓✓ ( with one mistake or reverse TryLysAlaLeu ✓ ) 2

(c) 3'-AAGGGCUUUCCA-5' ✓ (3' and 5' not essential ) 1

Question total 6

6 (a)(i) $H_2NCH(CH_3)CONHCH(CH_3)COOH$ ✓ 1
Accept displayed structure and the zwitterion

(ii) + $H_3NCH(CH_3)COOH$ ✓ 1

(b) α-helix/chain in coil or spiral ✓ or diagram 2

(c) (i) β-pleated sheet/flat or zigzag ✓ or diagram

(ii) bind to/carry ✓oxygen reversibly ✓/allow oxygen to bind ✓ as a ligand✓ 2

Four separate protein subunits ✓

One ✓ from:
Two α and two β units ( Use this to find first mark if necessary but then need further point for second mark).
An Fe in each unit
Precise fitting to form working protein 2



Question total 8

| | | |
|---|---|---|
| (b) (i) | (four) separate protein subunits aggregate to form the working protein | 2 |
| (ii) | bind to/carry oxygen reversibly | 1 |
| | | 8 |
| | Question total | |
| 6 (a) | | 2 |
| | Active site becomes saturated with substrate | |
| (b) | | |
| | Curve should be less steep<br>And flatten out well below the original | 2 |
| | | 4 |
| | Question total | 45 |

PAPER TOTAL