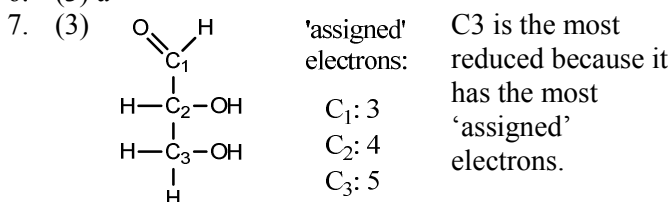


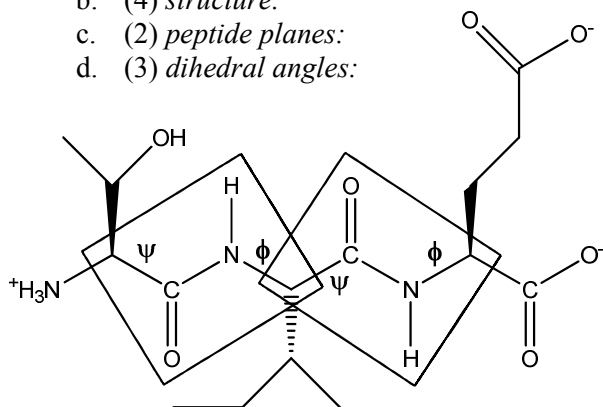
Exam 1 Answers

1. a. (1) True
b. (1) True
c. (1) False – *ice is more extensively H-bonded than liquid water*
2. a. (1) polarity
b. (3) 1 reducing end and 11 non-reducing ends
c. (3) Disulfide bonds; oxidation; cysteine
d. (1) Triacylglycerols (or triglycerides)
3. (2) Spontaneous clustering of non-polar solutes in water
4. (3) Water provides the driving force; its entropy increases (favored) as its contact area with solute decreases, which happens during clustering.
5. (3) It promotes forming a compact structure, since hydrophobic amino acids will cluster away from water.

6. (3) a



8. a. (2) A
b. (3) A, E
c. (2) Gene duplication events
d. (2) Number of sequence substitutions between the polypeptide and its predicted common ancestor (at the branch point)
e. (2) A
f. (2) G – *all the other protein chains are equally distantly related to myoglobin*
9. a. (2) Thr – Ile – Glu
b. (4) *structure*:
c. (2) *peptide planes*:
d. (3) *dihedral angles*:



- e. (4) N-term –NH₃⁺ → 8
C-term –COOH → 3
Thr –OH → 13
Glu –COOH → 4
- f. (2) 2-5, 7-9, 12-14

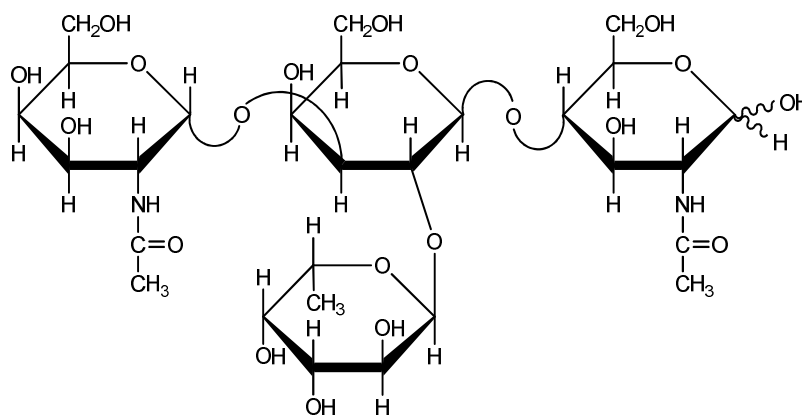
g. (3)

pH	Predominant charge				Net
	C-term	Glu	N-term	Thr	
< 3	0	0	+1	0	+1
> 3, < 4	-1	0	+1	0	<u>0</u>

$$pI = \frac{pKa_i + pKa_j}{2} = \frac{3 + 4}{2} = 3.5$$

- h. (1) -1
- i. (1) 4
- j. (1) Threonine –OH
- k. (3) $pH = pKa + \log \frac{[A^-]}{[HA]} = 13 + \log \left(\frac{25\%}{75\%} \right) = 12.5$
- l. (3) At pH 12.5:
 - C-term is nearly all deprotonated; average charge = -1
 - Gly is nearly all deprot; ave. ch. = -1
 - N-term is nearly all deprot; ave. ch. = 0
 - Thr is 75% prot, 25% deprot, ave. ch. = 0.25 x (-1) = -0.25
 - Sum: (-1) + (-1) + 0 + (-0.25) = -2.25; round to **-2.3**
- m. (2) True
- n. (2) True
- o. (2) False – 3 amino acids isn't enough to form a helix

10. (12)



11. a. (1) True
b. (1) True
c. (1) True
d. (1) False
12. (2) L-galactose
13. (2) d
14. (3) c
15. (4) b, d, e