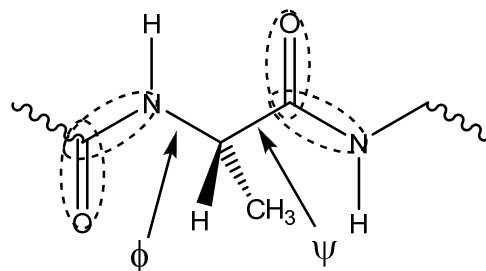


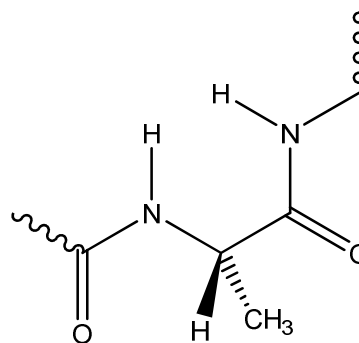
Exam 1 Answers

1. d
2. False. *Water's boiling point is higher because it has more H-bonds.*
3. a
4. b
5. a, b, d
6. *Osmosis is the movement of solvent from a region of higher to lower solvent concentration*
7.
 - a. -2
 - b. ion pair (or salt bridge); Arg, Lys, or His
 - c. 1.83-3.83, 4.69-6.69
 - d. $\text{pH} = \text{pKa} + \log\left(\frac{[\text{A}^-]}{[\text{HA}]}\right)$
 $[\text{A}^-]/[\text{HA}] = 10^{\text{pH}-\text{pKa}}$
 $\text{pKa}_2: [\text{COO}^-]/[\text{COOH}] = 10^{8.5-5.69} = 10^{2.81} = 646$; 1/647 protonated at 1st group
 $\text{pKa}_1: [\text{COO}^-]/[\text{COOH}] = 10^{8.5-2.83} = 10^{5.67} = 467,735$; 1/467,736 protonated at 2nd group
 multiply to get fraction protonated at both groups: $(1/647) \times (1/467,736)$
 $= 1/3.02 \times 10^8 = 3.3 \times 10^{-9}$
 - e. This happens halfway between the two pKa's:
 $(2.83 + 5.69) / 2 = 4.26$
 - f. In glycine, the positive charge on the amino group favors having a balancing negative charge on the carboxyl group, which promotes its deprotonation (and a lower pKa). Malonic acid lacks this charge stabilization, so it is less likely to lose a proton (so its pKa is higher).
 - g. True
 - h. True
 - i. True
 - j. False
 - k. True
8.
 - a. identity: E – 16 of 25 residues are identical
 similarity: G – 21 of 25 residues are similar;
 'non-similar' residues are at positions 4 (V/P), 9 (K/P), 10 (E/Q), and 25 (E/S)
 - b. A, C

9. a.



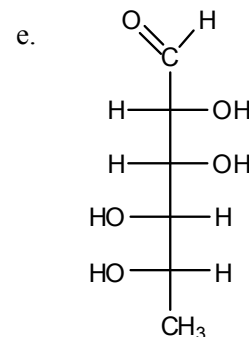
b.



c. There is steric hindrance caused by the alignment of the backbone amide N-H's.

10. α -helix: 1.5Å/aa; β -strand (antiparallel): 3.5Å/aa
 $30\text{Å helix} \div 1.5\text{Å/aa} = 20 \text{ aa's}$
 $20 \text{ aa's} \times 3.5\text{Å/aa} = 70\text{Å}$

11. a. False
- b. False
- c. True
- d. β

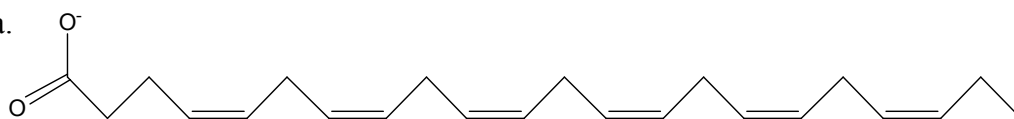


f. L-mannose (or β -L-mannopyranose)

12. (1) Lipids are more reduced than carbohydrates
 (2) Carbohydrates are hydrated

13. Stearic acid

14. a.



b. 22:6 ($\Delta^{4,7,10,13,16,19}$)