

ANSWER KEY

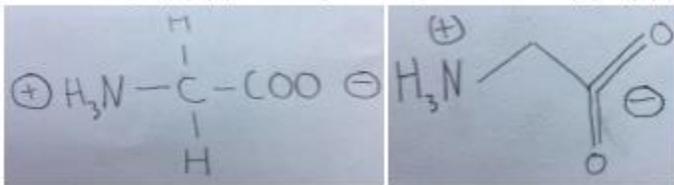
(___/50)

(All multiple choice is worth 1 point each)

- 1) B
- 2) A
- 3) B--- Tie breaker
- 4) D
- 5) C
- 6) D
- 7) C
- 8) A
- 9) B
- 10) B
- 11) D
- 12) Sodium Dodecyl Sulfate-PolyAcrylamide Gel Electrophoresis (0.5 pts per correct letter-count PolyAcrylamide as one letter-3 pts total)
- 13) Anfinsen's experiment showed that proteins can spontaneously adopt their natural conformations (1 pt), due to the fact that sequence determines structure (2 pts)
- 14) 1) Van der Waals forces 2) hydrophobic interactions 3) disulfide bonds (1 pt per correct term placement; 3 pts total)
- 15) Glycine and proline (1 pt per correct amino acid; 2 pts total)
- 16) SEC (or Size Exclusion Chromatography) (2 pts)

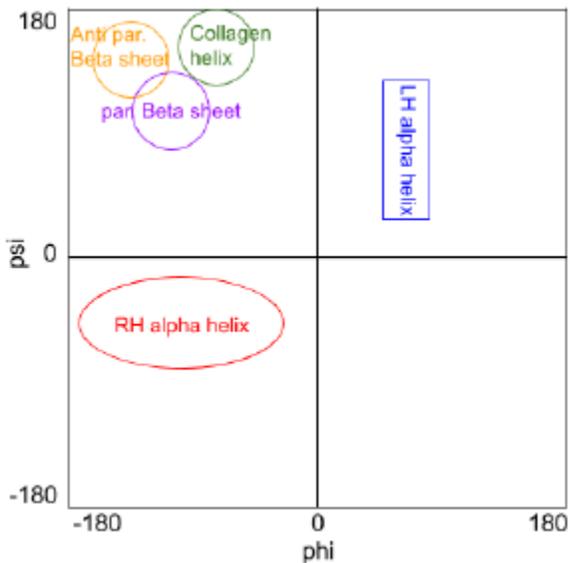
Free Response

- 1) Per part, 1 point if 1 correct amino acid listed
 - a) Cysteine (1 pt); the thiol groups of 2 cysteines bond to each other via oxidation (1 pt)
 - b) Accept isoleucine OR leucine (1 pt); the side chains of the amino acids in the helix sequence are hydrogen bonded (1 pt) to each other to form a spiral.
 - c) Accept glutamate OR aspartate OR arginine OR lysine (1 pt); a proton migrates from the carboxylic acid group of Glu or Asp to the amine group of Arg or Lys. Alternatively, accept "salt bridges occur due to the simultaneous formation of a hydrogen and ionic bond." (1 pt)
- 2)
 - a) A variation of either photo below is acceptable, but the drawing must express a positive charge on the amino group (1 pt) and a negative charge on the carboxyl group (1 pt).



- b) 0 (1 pt)
- c) Accept isoelectric point OR pI (1 pts)
- d) The isoelectric point (pI) is calculated by taking the average of the pK_a values (1 pt) (which measures how tightly the acid holds onto a proton; i.e., how strong the acid is) (1 pt) on either side of the amino acid.

3) 1 pt per correct—really does not need to be exact, just as long as everything is relatively in the right area. (5 pts total)



4)

a) UCG-UUC-GAC-GUU-UGA (2 pts, 1 pt if 2-4 codons are correct)

b) Accept serine-phenylalanine-aspartic acid-valine-stop OR ser-phe-asp-val-stop OR S-F-D-V-stop (2 pts, 1 pt if 2-4 amino acids are correct)

c) Codon (1 pt)

d) Methionine (1 pt) ; AUG (1 pt)

5)

a) Aspartic acid (1 pt)

b) Aspartic acid (1 pt)

c) Arginine (1 pt)