Instructions (shown before students start the test)

Welcome to the MI Region 7 January workshop Protein Modeling event. This is a noncompetitive workshop, and no recognition of places will be made. The intent of the this pract test is to give a glimpse of the types of topics and questions that you might see in future tournaments. Also, to give you some experience into the Scilympiad test platform. Good

Introduction (shown after students start the test)

The test questions themselves should be pretty straightforward to understand. Do your best and hopefully you will be better prepared for competitive tournaments in the future.

The questions in this test have come from past invitational tournaments, most notably the Centerville 2020 Invitational, the UGA 2020 Invitational, and the Plymouth - Canton 2020 Invitational.

1. (1.00 pts) Alpha helices are typically _____ handed due to being composed of _____.

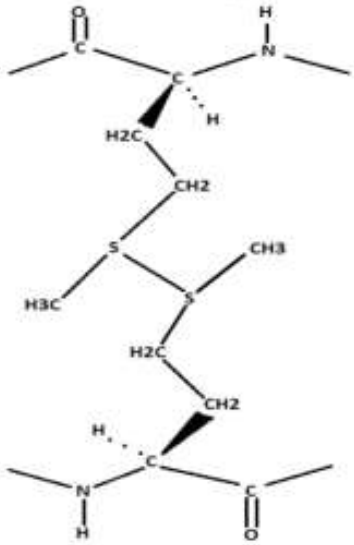
- A) Left, D-enantiomers
- B) Right, D-enantiomers
- C) Right, L-enantiomers
- D) Left, L-enantiomers

2. (1.00 pts) Select the correct order of bond strengths listed from weakest to strongest:

- A) Van der Waals, Covalent, Ionic, Hydrogen, Disulfide
- B) Van der Waals, Hydrogen, Ionic, Disulfide, Covalent
- C) Ionic, Van der Waals, Disulfide, Hydrogen, Covalent
- D) Disulfide, Ionic, Van der Waals, Covalent, Hydrogen

3. (1.00 pts) Select the correct representation of a disulfide bond:

A.



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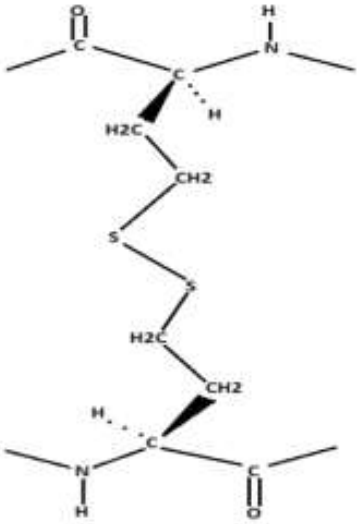

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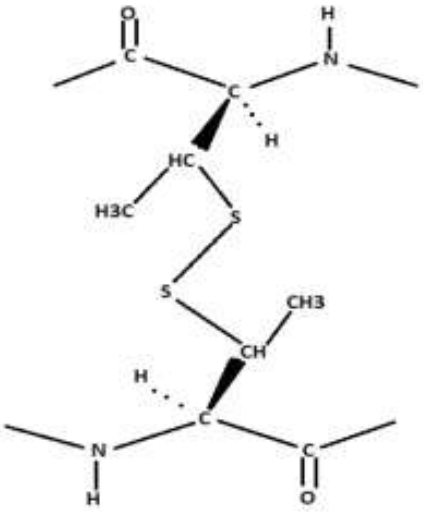

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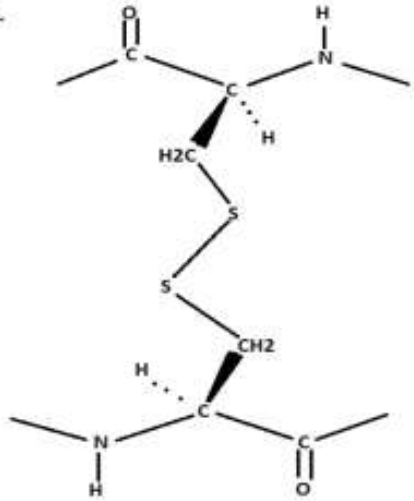

- A) A
- B) B
- C) C
- D) D

4. (1.00 pts)
Right-handed alpha helices are the most common stable form of helix formation in protein secondary structures, though other helix formation such as the 3/10 helix and π helix r exist as well.

- True
- False

5. (1.00 pts) Which Amino Acid has an achiral molecular configuration?

- A) Glycine
- B) Alanine
- C) Histidine
- D) Phenylalanine

6. (1.00 pts) The ring structure of this Amino Acid results in a conformational restriction, most often resulting in a β turn secondary structure:

A) Tryptophan
B) Tyrosine
C) Proline
D) Histidine
E) Phenylalanine

7. (1.00 pts) Which Amino Acid sequence would most likely result in alpha helix formation?

A) Leu-Arg-Phe-Leu-Asp
B) Val-Arg-Leu-Arg-Ile
C) Gln-Pro-Trp-Asp-Gly
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8. (1.00 pts) With a pKa value near 6, this Amino Acid is easily ionizable and often found in the active site of enzymes:

A) Cysteine
B) Histidine
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9. (1.00 pts)
Which bond may form the nucleus of a hydrophobic core, allowing local hydrophobic residues to condense around it through hydrophobic interactions, decreasing the effective local water concentration, and thus stabilizing secondary structures in its vicinity?

A) Covalent Bonds
B) Hydrogen Bonds
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10. (1.00 pts) A protein with a molecular weight of 12,500 would have a mass of:

A) 12.5 Daltons
B) 25000 Daltons
C) 12,500 Kilodaltons
D) 12.5 Kilodaltons

11. (1.00 pts) Which of the following does not contribute to the stability of proteins in solutions?

A) Acid-base principles
B) Ionic strength of solutions
C) Glycans present on proteins
D) All of the above contribute to protein stability

12. (1.00 pts) Which of the following statements about the central dogma of molecular biology is true?

A) Information is transferred from RNA to DNA to proteins
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C) Information is transferred from DNA to RNA to proteins.

D) None of the above

13. (1.00 pts) How do amino acids polymerize?

A) Peptide bonds

B) Hydrogen bonds

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D) None of the above

14. (1.00 pts) Which of the following amino acids have a chiral center at their alpha-carbons?

A) Tyrosine

B) Proline

C) Glycine

D) None of the above

15. (1.00 pts) How many major types of post-translational modifications to a protein are there?

A) 1

B) 2

C) 3

D) 4

E) 5

16. (1.00 pts) Which of the following statements about protein folding is true?

A) They acquire their structure by spontaneously folding.

B) The proteins fold in a maximum energy configuration

C) No proteins require no external factors in order to fold.

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17. (1.00 pts) What can happen in protein denaturation?

A) Proteins lose their structure when put in an unsuitable environment.

B) Denatured proteins still have a defined structure but aggregate into insoluble masses.

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18. (1.00 pts) Which of the following correctly describes the isoelectric point?

A) It is the pH-value in which a protein is charged.

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19. (1.00 pts)
The genome of the rabies virus is negative-sense RNA. Negative sense means that the nucleic acid sequence is complementary to mRNA. What enzyme must be present in orde
for this virus to produce its viral proteins and replicate?

- A) DNA-dependent DNA polymerase
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20. (1.00 pts) The two functional groups found on every amino acid are:

- A) amino group ; carbonyl group
- B) amino group ; carboxyl group
- C) carboxyl group ; phosphate group
- D) carboxyl group ; hydroxyl group
- E) phosphate group ; amino group

Good Job! Hopefully this practice test was worthwhile and you have a better understanding of both the event and Scilympiad. Remember you can join the virtual meeting for ar
opportunity to talk with some of the supervisors from today's workshop.

Protein Modeling C - Protein Modeling C - MI Region 7 January Workshop - Region 7 January Workshop - 01-16-2021

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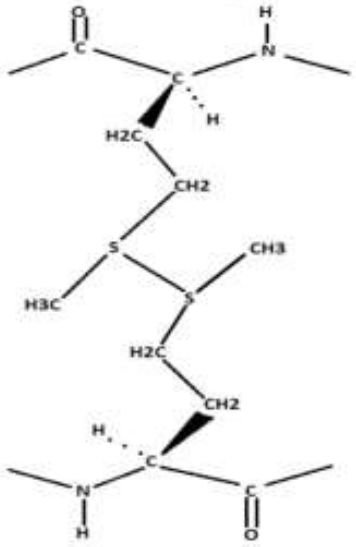

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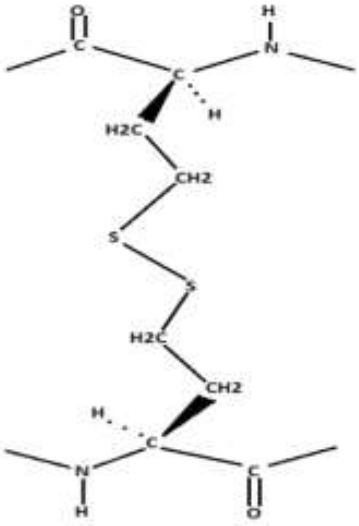

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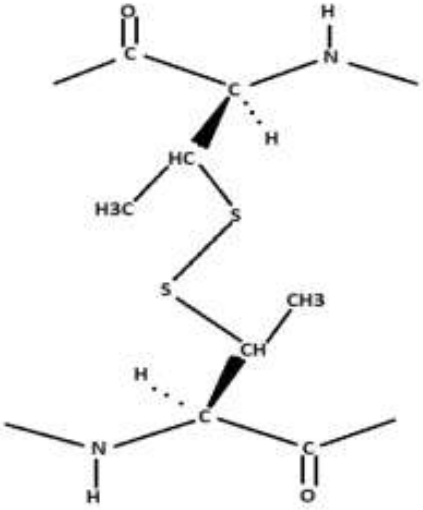

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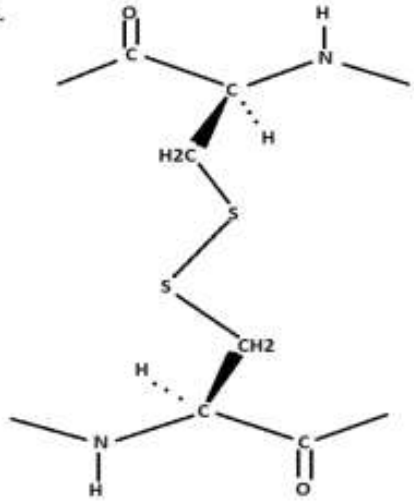

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