Protein Modeling - Division C Master Key - Onsite

University of Texas-Austin Invitational

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Written by Sophia Velasco, University of Florida, B.S. Biochemistry 2023

Instructions and Clarifications:

- You have **50** minutes to finish this exam and the computer exploration of protein structure. This exam accounts for the onsite portion of the event.
- Each **participant** may bring **one** 8.5" x 11" sheet of paper that may be in a sheet protector or laminated that contain information without any annotations or labels affixed along with writing utensils for each participant.
- You **may** not write on this exam. Only the **answer sheet** will be graded.
- Write your team number on every page of the answer sheet.
- Tiebreakers are labeled as **TB#**. There are **five** tiebreakers in this exam.
- If you have any questions or comments about this exam, feel free to email me at velasco.scienceolympiad@gmail.com. **Happy testing!**

Directions: The following questions refer to the crystal structure of **cytidine deaminase complexed with uridine.** Use the computer to explore the structure and answer the following questions below. Each question is worth **one** point unless otherwise stated. **(22)**

1. How many hydrogen bonds are present in the nucleic portion of this protein? **0**

2. The following questions refer to residue 22. (4)
    a. What amino acid is residue 22? **Proline**
    b. Is this amino acid polar or nonpolar? **Nonpolar**
    c. Would this amino acid be located in the interior or exterior of the protein? Explain. (2) **Interior, would be located in the hydrophobic core since proline is hydrophobic**

3. The following questions refer to residue 80. (3)
    a. What amino acid is residue 80? **Valine**
    b. True or False: This amino acid is aliphatic. **True**
    c. True or False: This amino acid is hydrophobic. **True**

4. The following questions refer to residue 166. (3)
    a. What amino acid is residue 166? **Glycine**
    b. True or False: This protein is proteinogenic. **True**
    c. True or False: This protein is encoded by all the codons starting with AG. **False**

5. The following questions refer to residue 126. (4)
    a. What amino acid is reside 126? **Tyrosine**
    b. True or False: This amino acid has a nonpolar side group. **False**
    c. What is the name of this amino acid when it is in its phosphorylated form? (2) **phosphotyrosine**

6. How many struts are present between amino acids 124-201? (2) **6**

7. How many struts are present in the nucleic structure of this complex? (2) **0**

8. How many glycine amino acids are found in amino acids 150-192? **80**

9. How many atoms are present in the helix of this structure? **890**

10. How many atoms are in the sheet of this structure? **361**