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Protein Tertiary Structure

This worksheet accompanies the Jmol Exploration: Protein Primary and Secondary Structure which can be accessed at:

<https://cbm.msoe.edu/modelingResources/molecularExplorations/TertiaryStructure.html>

Question numbers are included in the exploration for easy referencing.

online, then export the answers by clicking on the button at the end of the tutorial. Alternately,

1. What is the predominant color in hydrophobic sidechains?
2. What atom is represented by this color?
3. What additional color appears in acidic sidechains, and what atom does it represent?
4. What additional color appears in basic sidechains, and what atom does it represent?
5. What atoms are found in polar neutral (hydrophilic) sidechains?
6. What atom is found in tryptophan that is not found in other hydrophobic sidechains?
7. Why isn't tryptophan classified as a polar sidechain?
8. Which type of side chains will be on the inside of most proteins? Why?
9. Which side chains will be attracted to the negatively charged side chains? Why?
10. Which side chains will be attracted to the positively charged side chains? Why?

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11. Which side chains will be attracted to the polar neutral side chains? Why?

12. Will the final shape of the protein be a high energy state or a low energy state for all the atoms in the structure? Why?

Select the following combination of amino acid side chains to make your protein:

- Methionine (place at N terminus)
- 5 hydrophobic side chains (yellow clips)
- 3 polar neutral side chains (white clips)
- 2 acidic side chains (red clips)
- 2 basic side chains (blue clips)
- 1 cysteine (green clips)

13. What level of protein structure is displayed in the sequence of amino acids on the toobar?

14. Where does that information originate in a cell to make this protein?

15. As you added each new set of chemical conditions (hydrophobic, positive and negative, polar, and S-S covalent bond) – what happened to the folding and your structure? Why?

16. Does your protein look like any of the others in the class? Why or why not?