**Proteins**

|  |  |
| --- | --- |
| **Monomer:** | Amino Acids (20) |
| **Polymer:** | Polypeptide |
| **Amino Acids**  **Functional groups**  **and**  **Common Structure:** | **Uncharged:**    **Charged:** |
| **Side Chains and Properties:**  **(common compositions)** | **1)** Polar: hydrophilic  2HN-C=O, -OH, -SH  **2)** Non-polar: hydrophobic  Hydrocarbons  **3)** Charged: polar, hydrophilic  **-**Acidic: **-**Basic |
| **Reaction to Form Polypeptides:** | Dehydration Synthesis |
| **Type of Bond formed:** | Peptide Bond |
| **4 Levels of Structure** | |
| **Primary:** | Linear amino acid sequence |
| **Secondary:** | Backbone interactions: Hydrogen bonding  **-**Alpha Helix: H-bonds between every 4th amino acid in polypeptide, helical coil  **-**Beta Pleated Sheet: H-bonds between parallel segments of polypeptide, pleated sheet |
| **Tertiary:** | Side chain interactions:  **-**Hydrophobic: nonpolar side chains aggregate, van der Waals interactions ensue  **-**Polar: H-bonds between side chains  **-**Ionic bonds  **-**Disulfide Bridges: between two cysteine side chains with sulfhydryl groups (-SH HS- -----> S-S) |
| **Quaternary:** | Interactions between two or more polypeptides |
| **Chaperonins:** | Proteins that assist in the proper folding of a polypeptide by shielding it from the cellular environment |
| **Denaturation:**  **Causes & Effects** | The unfolding of a protein that results in loss of functionality.  -Change in pH, salt concentration, temperature  -Exposure to chemicals or nonpolar solvent |
| **Diseases Associated with Misfolding:** | Cystic Fibrosis, Alzheimer's, Parkinson's, Sickle Cell Anemia |
| **Protein Functions:** | Enzymes, Transport, Contractile/Motor, Storage, Hormonal, Receptor, Protection, Structure |