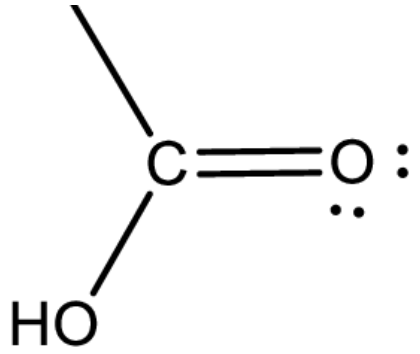
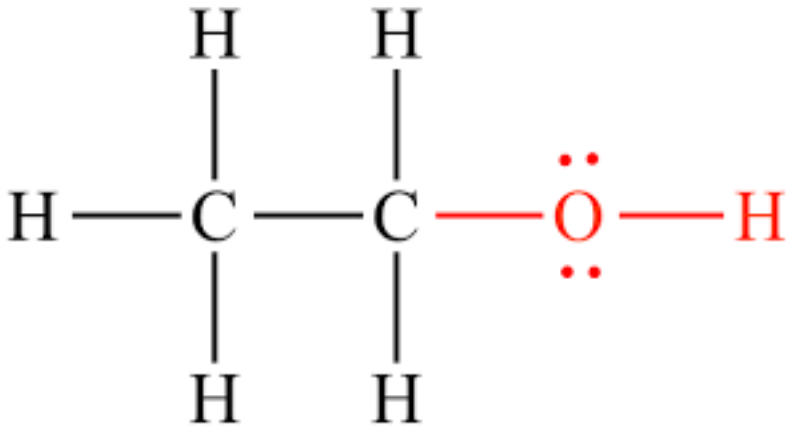
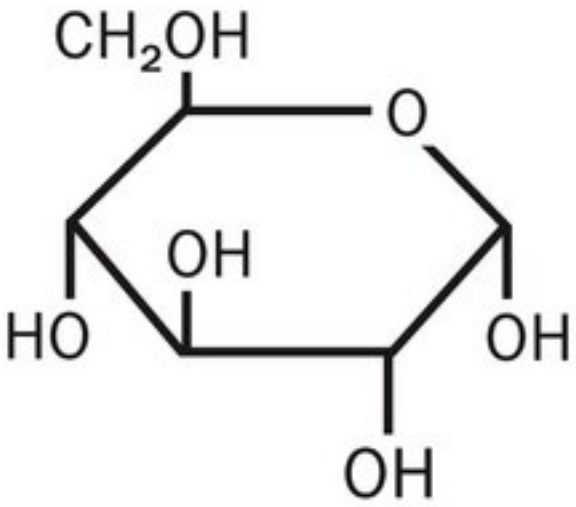
Happy Wednesday

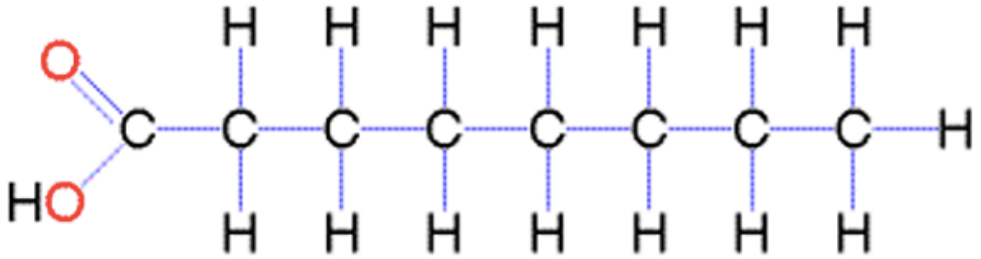
What are each of the following



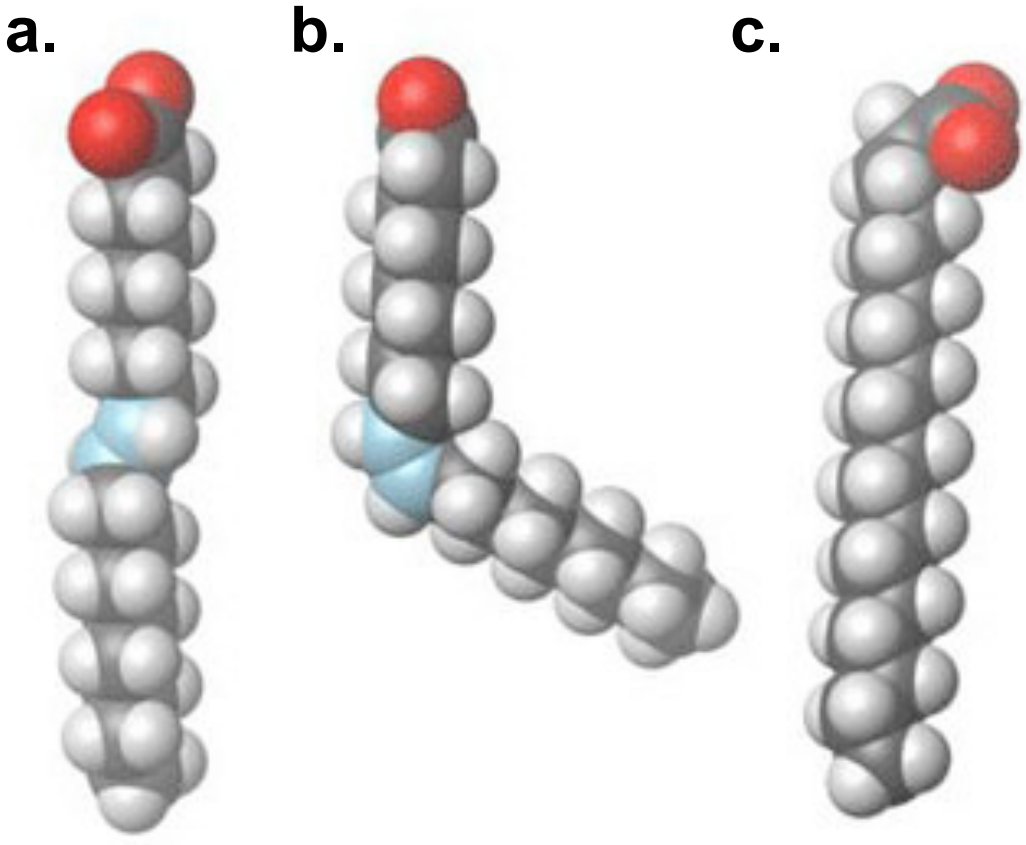


- What types of molecules are these?
- How could you bond these two together? Show.

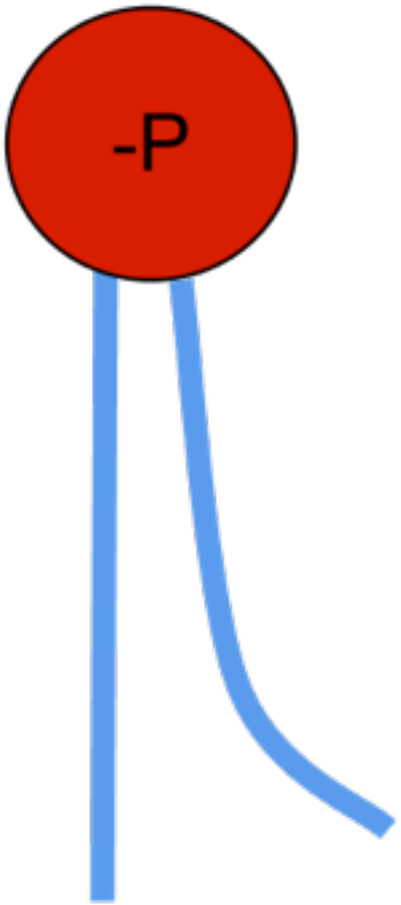


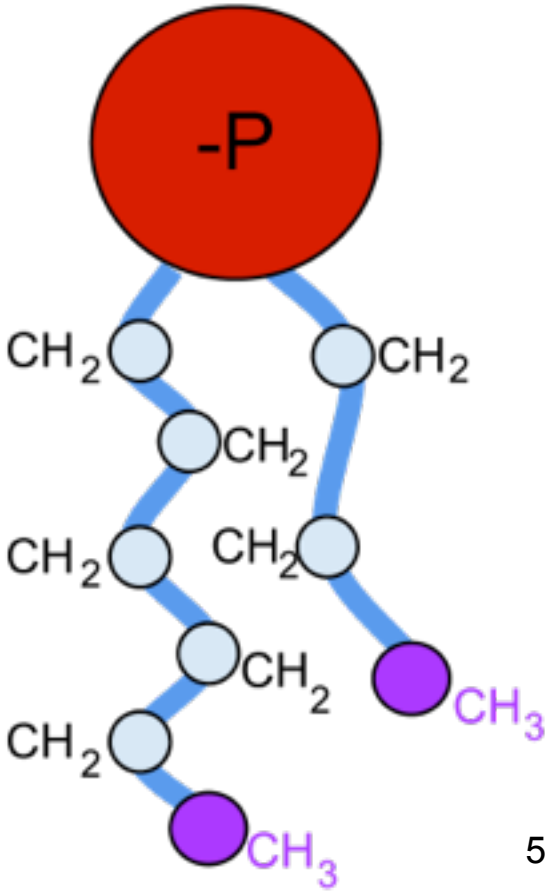


a. Identify the three molecules.
b. Are they polar or non-polar?



a. Identify the molecule.
b. Are they polar or non-polar?

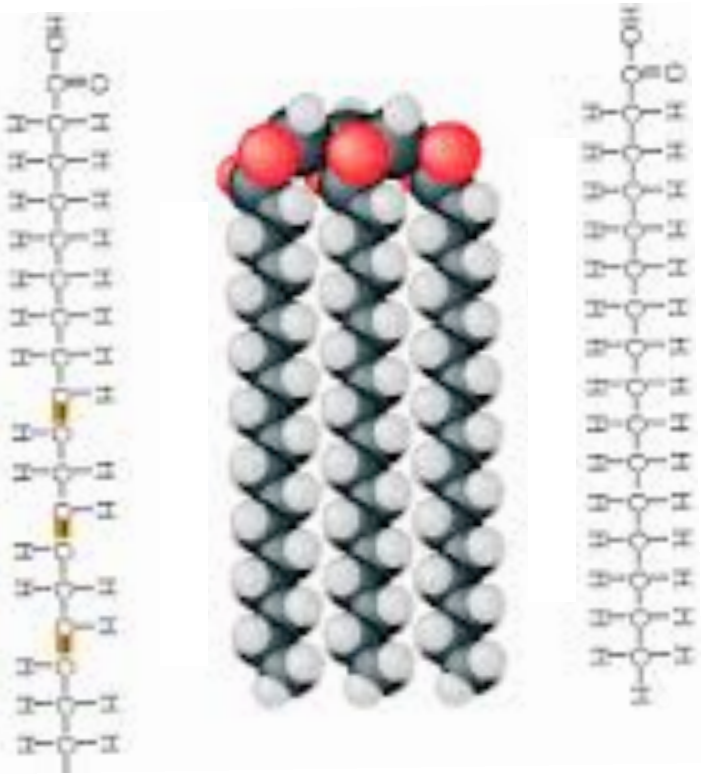




a. Identify the two molecules.
b. Which would be solid at room temperature?
c. How could you alter (a) to resemble (b)?

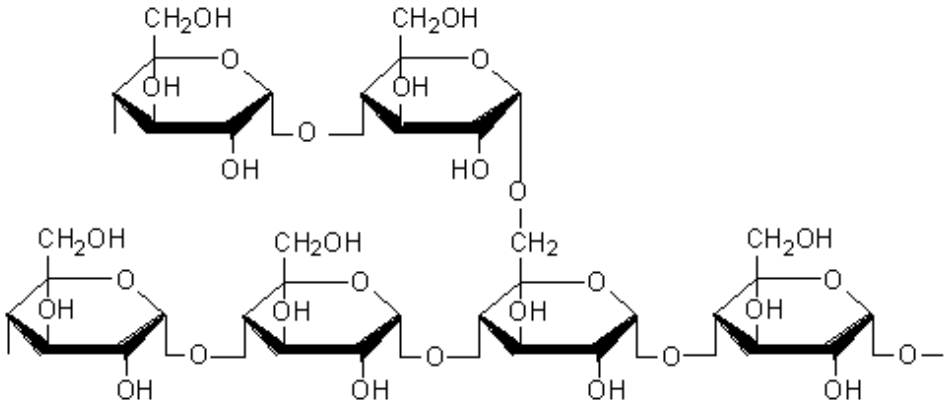
a.

b.

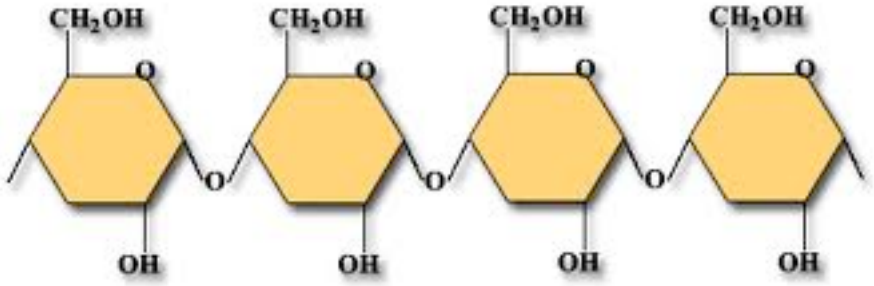


Identify the three molecules.

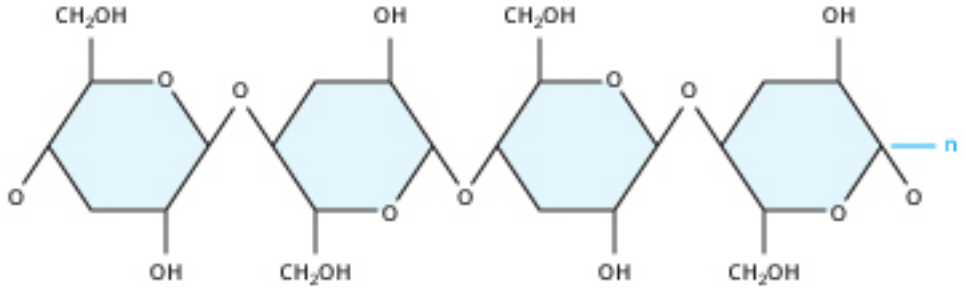
a.



b.

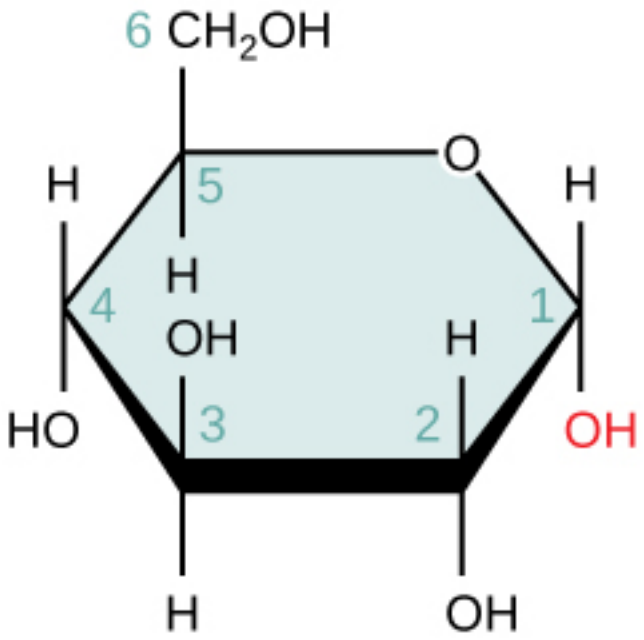


c.

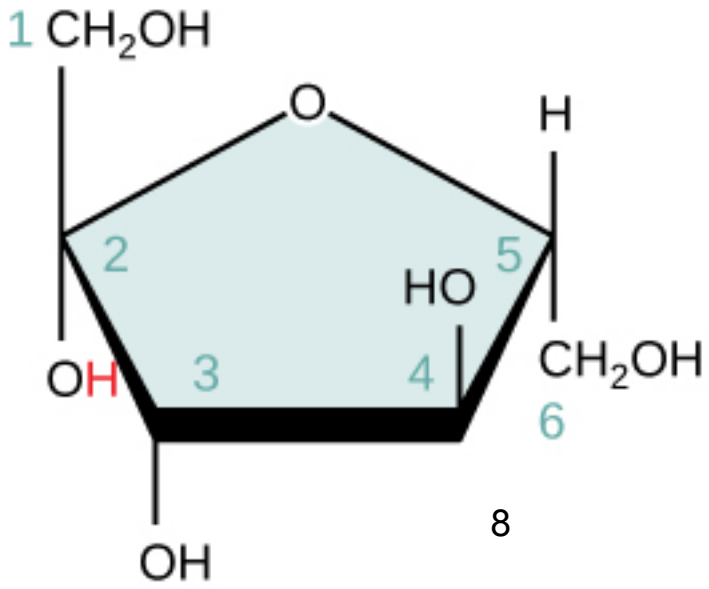


a. Identify the two molecules.
b. Where would you expect to find each?
c. What type of reaction joins these molecules? What molecule(s) is/are produced?

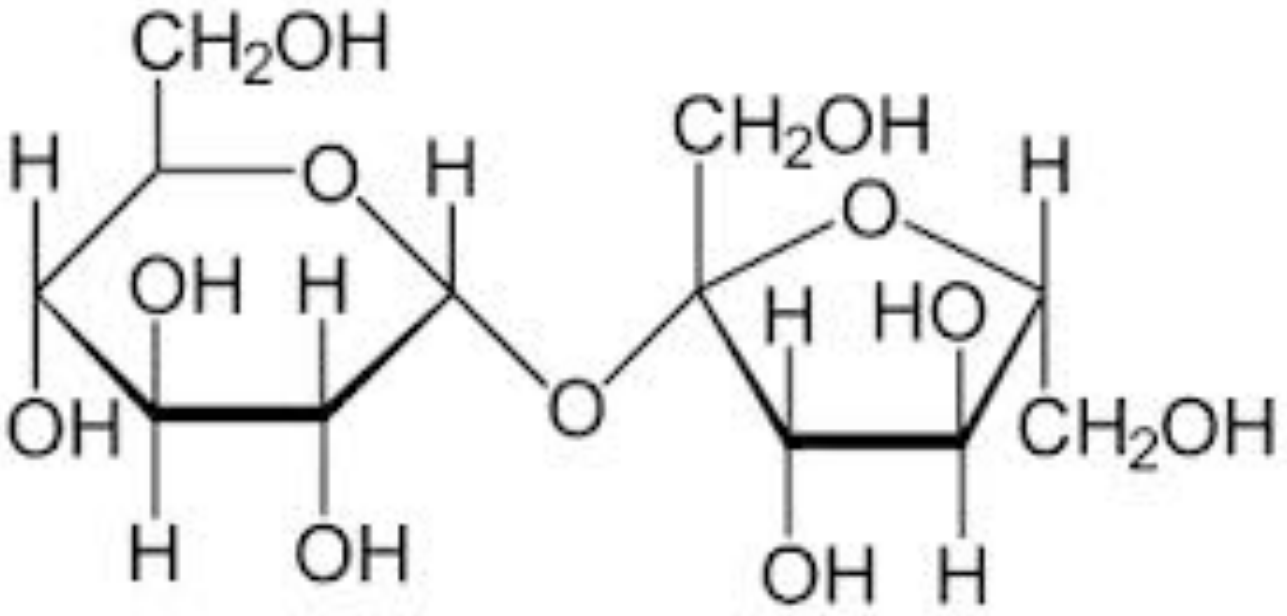
a.



b.



a. Identify the molecule.
b. Is this molecule polar or non-polar?



SBI4U - Biochemistry

Macromolecules

Proteins

Proteins

- proteins are largely responsible for structural and functional characteristics of living things
- they are categorized as:

Structural-

Signal-

recognition & receptor-

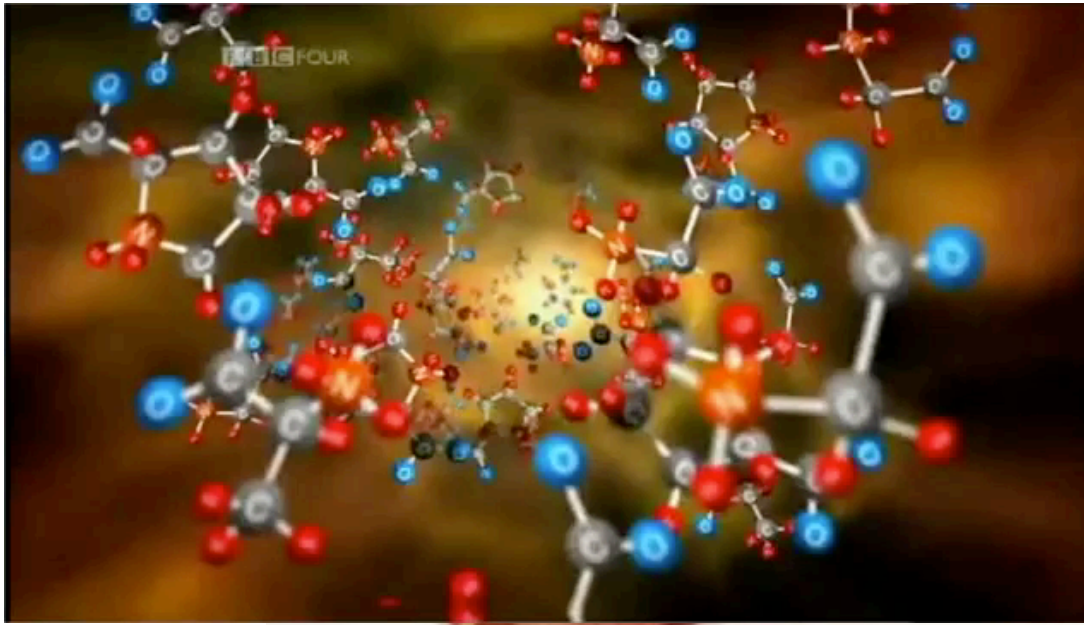
Motile-

Defensive-

Carrier-

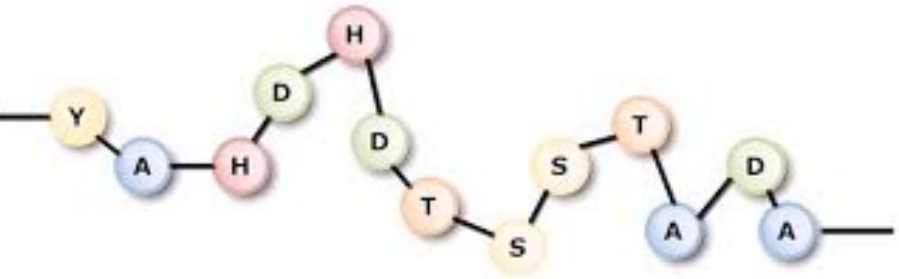
Enzyme-

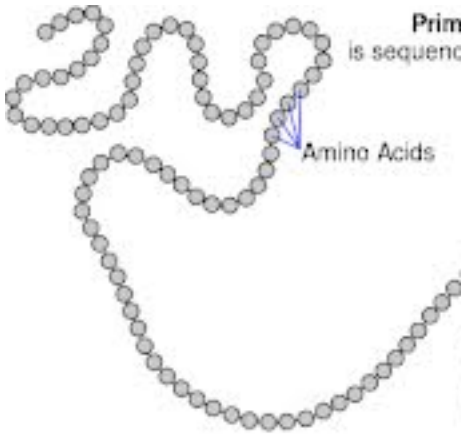
DNA packing



Proteins

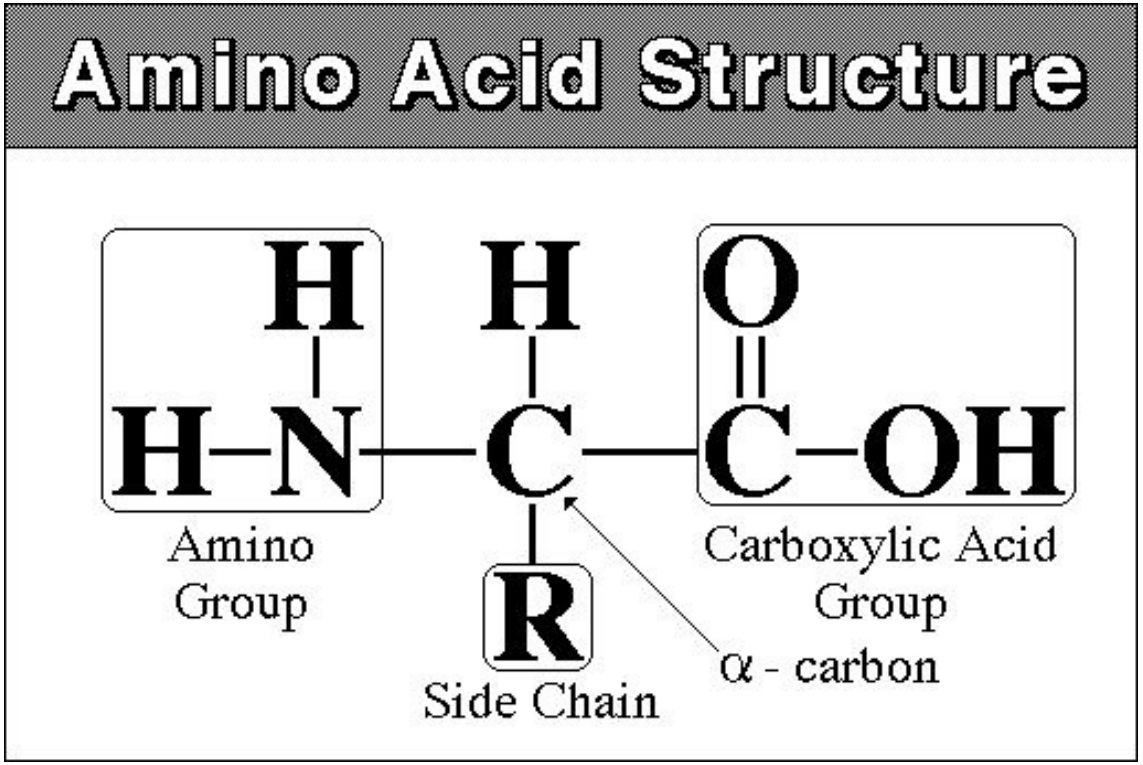
- **peptide** = chain of amino acids
- **polypeptide** = chain of many a.a.
- Oligopeptide = less than 20 a.a.
- sequence and number of a.a. in a protein determines the:
  - type of protein
  - final structure of the protein



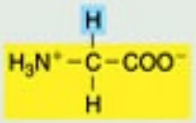


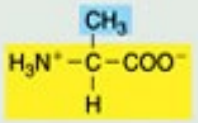
Amino Acids

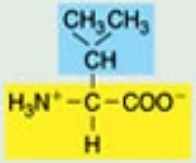
- all have the same basic structure
- 20 different amino acids
- 8 are **essential**
- **See pg.**

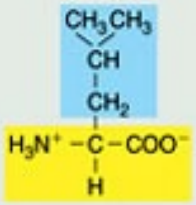


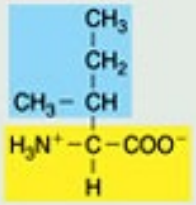
Nonpolar side chain

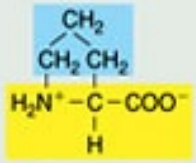

Glycine (Gly) G

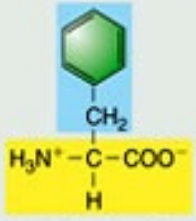

Alanine (Ala) A

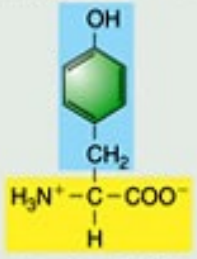

Valine (Val) V

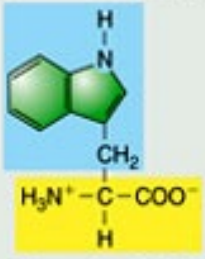

Leucine (Leu) L

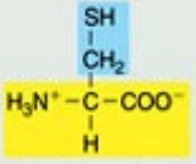

Isoleucine (Ile) I

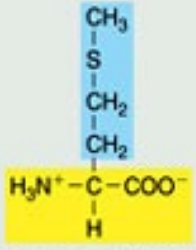

Proline (Pro) P


Phenylalanine (Phe) F

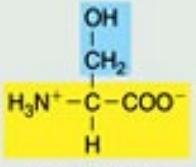

Tyrosine (Tyr) Y

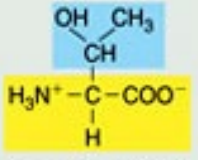

Tryptophan (Trp) W

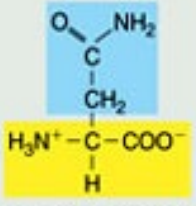

Cysteine (Cys) C

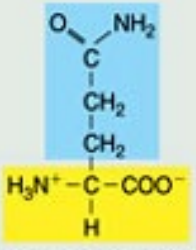

Methionine (Met) M

Polar side chain

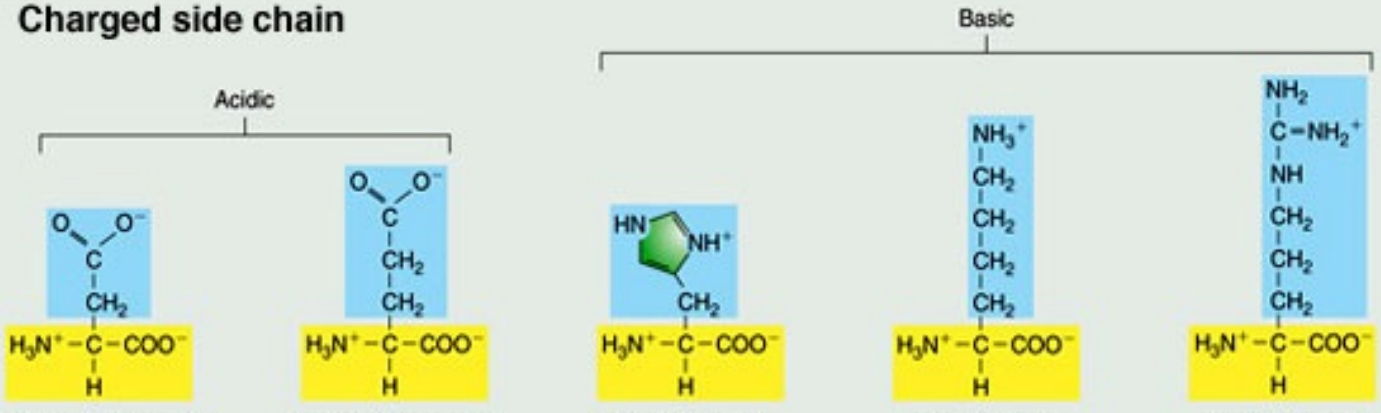

Serine (Ser) S


Threonine (Thr) T


Asparagine (Asn) N


Glutamine (Gln) Q

Charged side chain



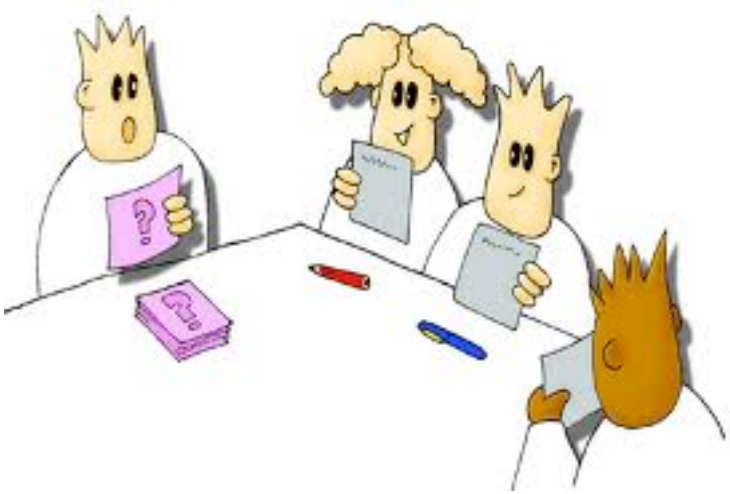
Aspartic acid (Asp) D

Glutamic acid (Glu) E

Histidine (His) H

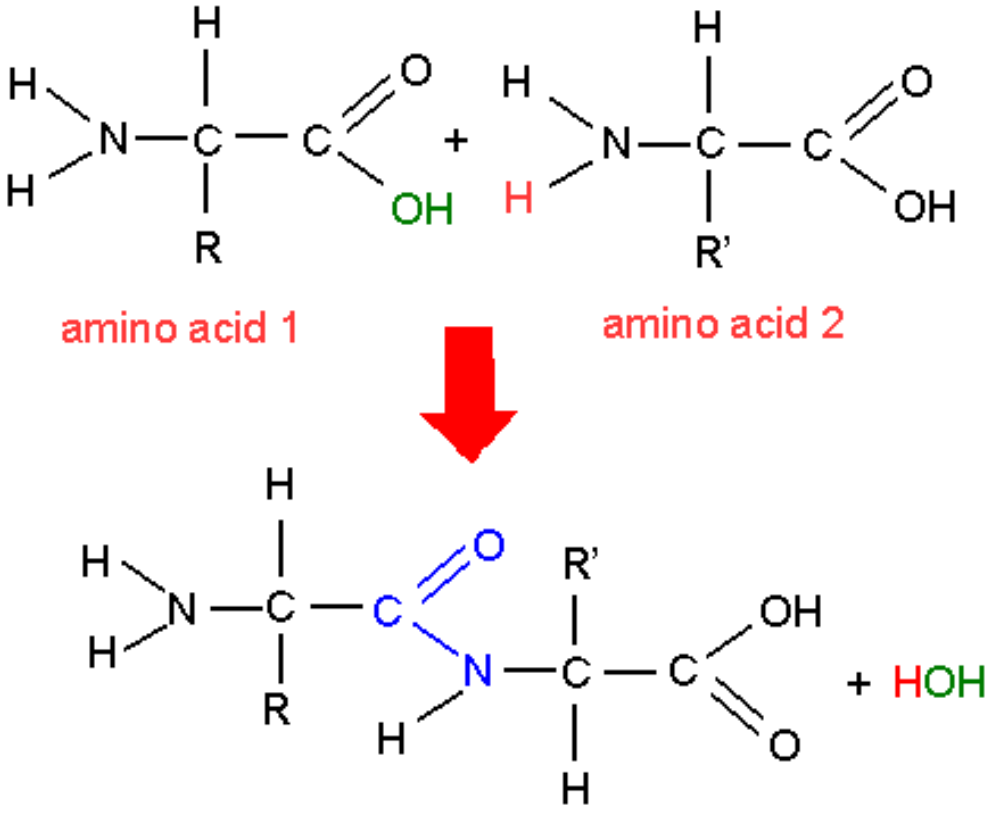
Lysine (Lys) K

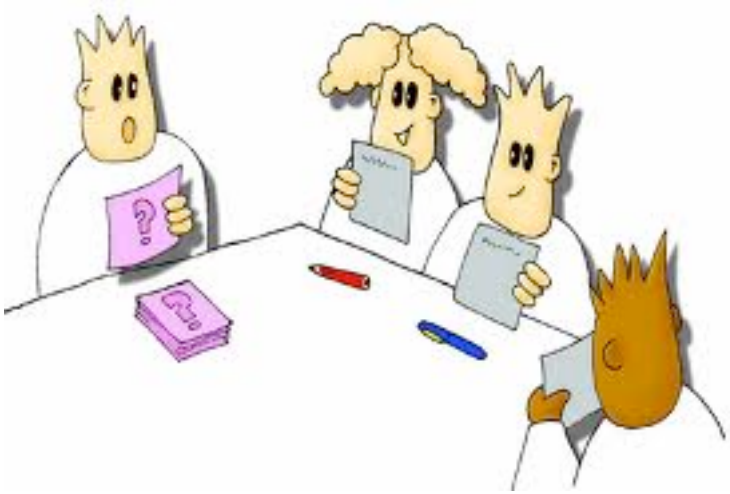
Arginine (Arg) R



1. What are the four major groups of amino acids?
2. Identify the most simple aa.
3. In which amino acid does the *amino functional group* form of a ring with the “R” group?
4. Which amino acids contain sulfur?
5. How many different peptides chains that are 3 aa long can be formed from the 20 kinds of aa? How about 5 long? How about 10

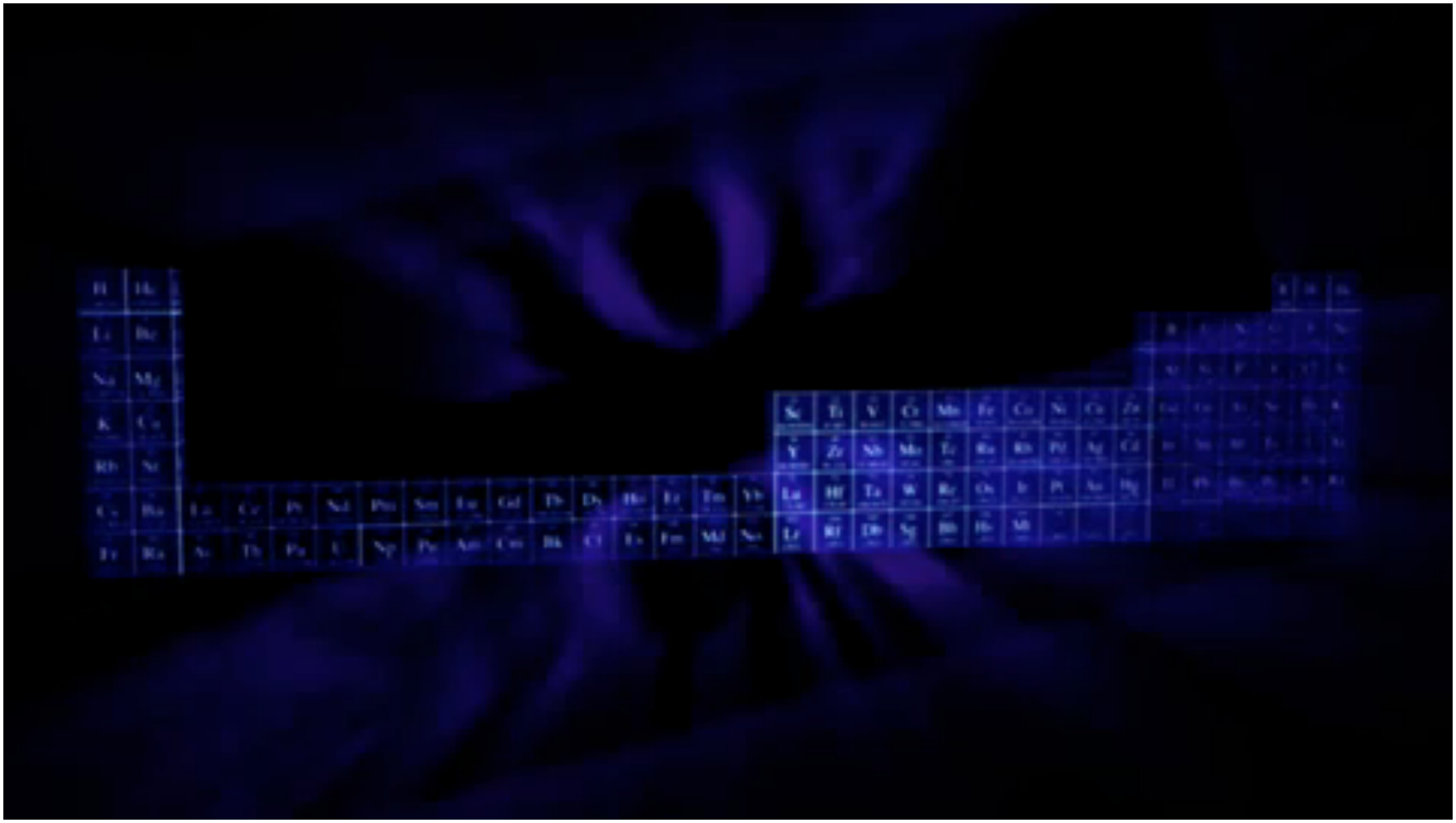
Peptide Bonds





Use the chart

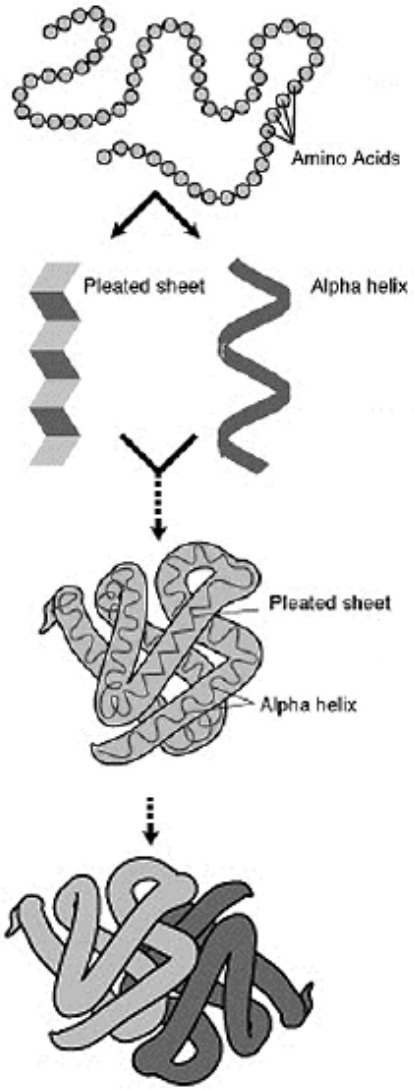
What are the aa that make up the peptide chain in provided by your teacher.



- https://www.youtube.com/watch?v=w-ctkPUUpUc

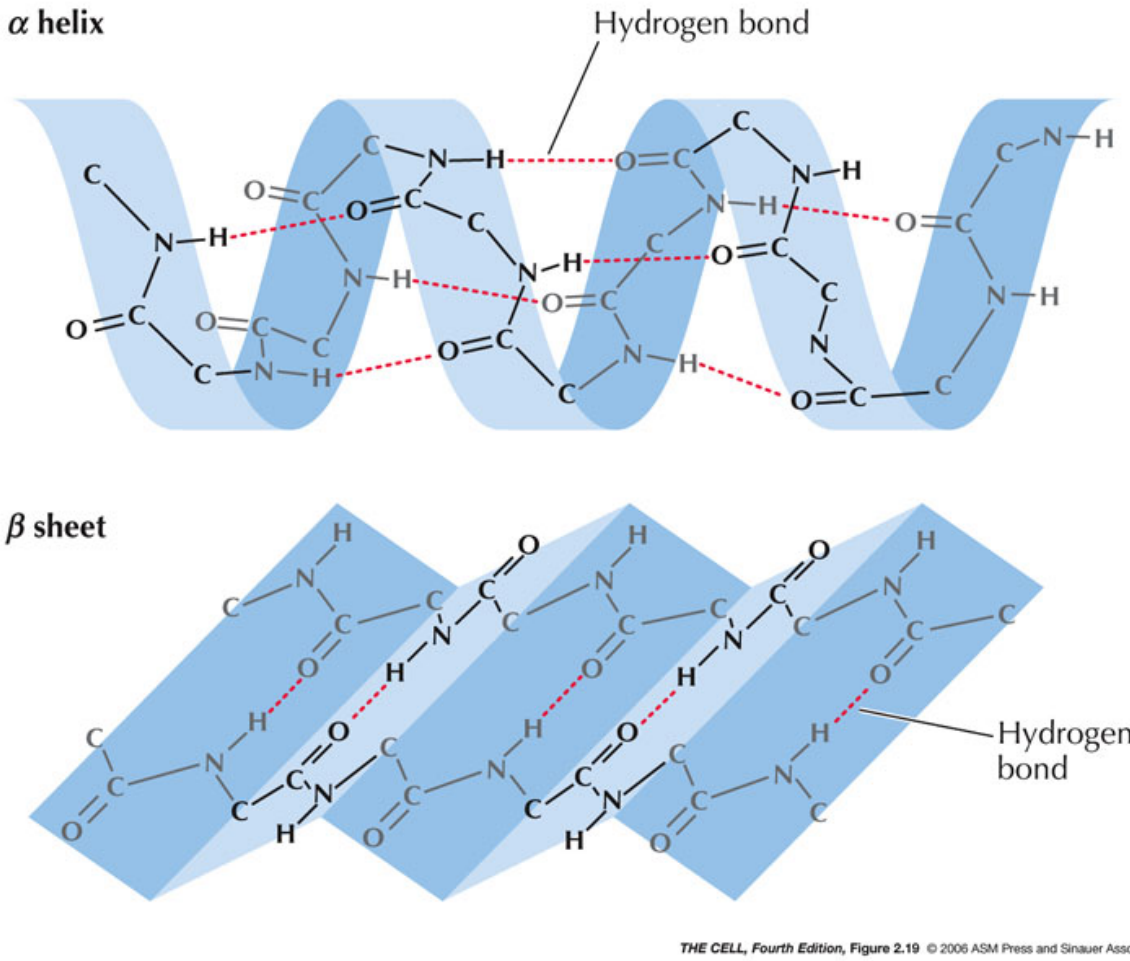
Levels of Protein Structure

- Different levels of structure of protein:
- Primary Order of aa
- Secondary aa coiled or pleated
- Tertiary polypeptide folded into a shape
- Quaternary two or more polypeptides together as one protein



Secondary Structure

- **a-helix**
- hydrogen bonds between -C=O of one aa form H bonds to the -N-H of a second aa
- the chain coils onto itself
- **ß-sheets (pleat)**
- hydrogen bonds between -C=O and -N-H of a parallel peptide lengths



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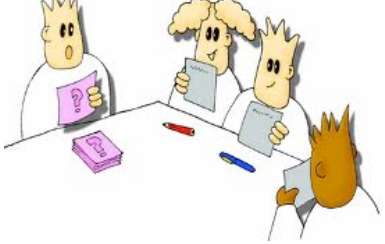
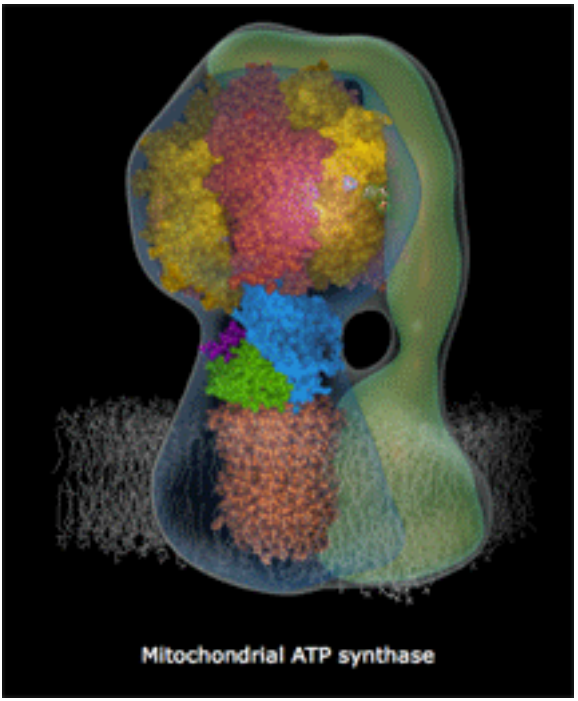


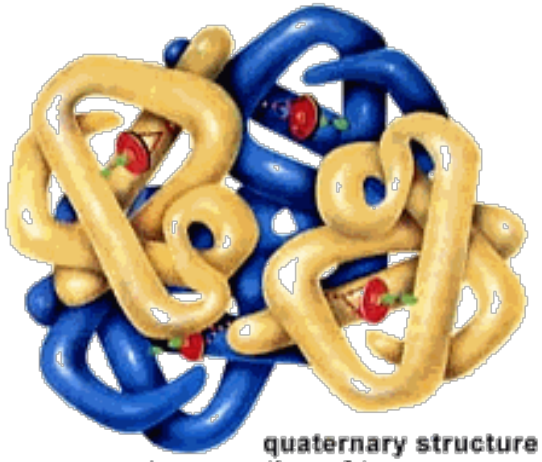
Tertiary Structure

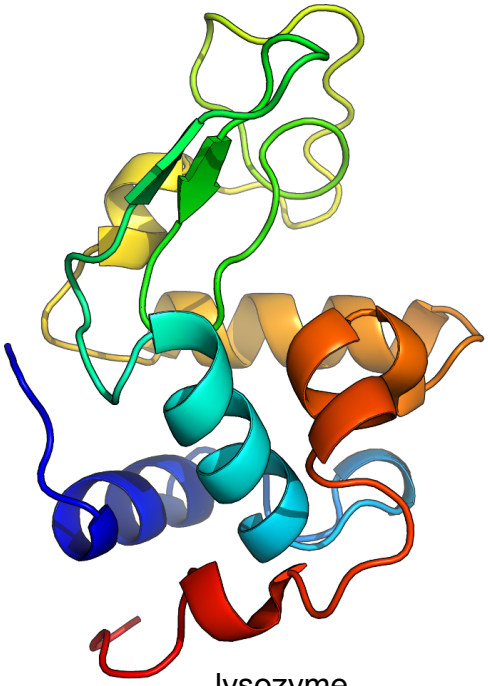
1. Examine the tertiary bonds found on the sheet provided
2. Which types of amino acids form each type of bonds?
3. Speculate on which types of tertiary bonds are the strongest?

Quaternary Structure

- proteins with more than one polypeptide chain that are held together have **quaternary structure**
- chains fit together in a very specific arrangement



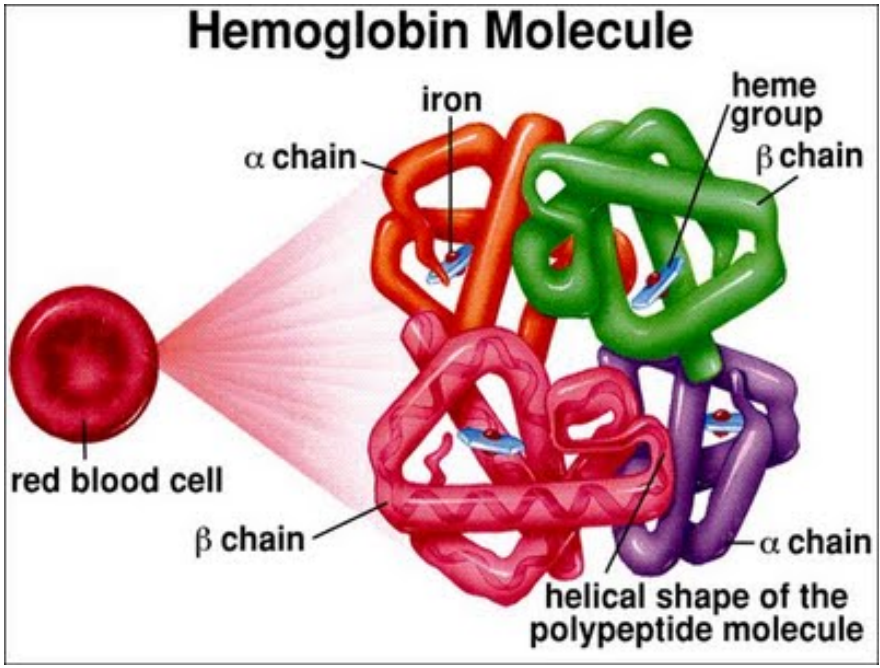




lysozyme

Structure of Hemoglobin

- Proteins like hemoglobin may have are components that give functionality called **prosthetic** groups
- heme (iron based molecule) in hemoglobin is an example



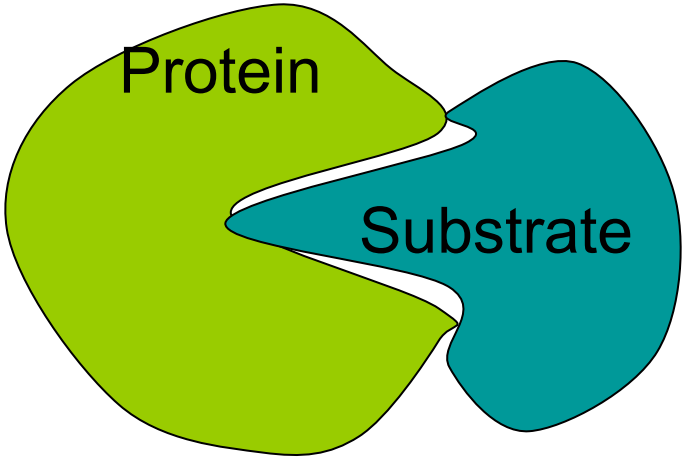
eg. hemoglobin has 4 polypeptides, and 4 heme groups (each with Fe^{2+} ion)

Sickle-Cell Anemia

- a DNA mutation causes a change in 1 amino acid in one of the 4 polypeptide chains of hemoglobin

- A protein's **shape** is very important!!

  ->if the shape changes, it can no longer function



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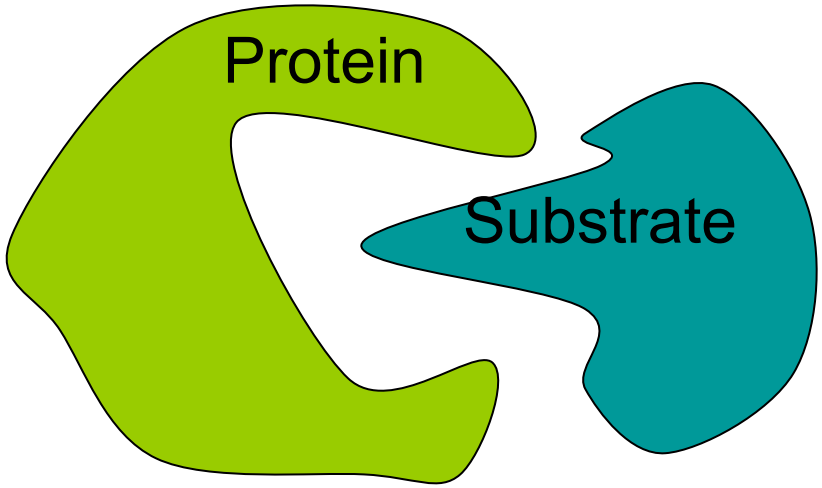

Protein Denaturation

- exposure to heat, radiation, or changes in pH can cause bonds between amino acids to be disrupted
- the shape of a protein to change
- therefore the protein can no longer function in biological activities
- sometimes change is irreversible

Assignment

- Research on 2 of the four proteins below;
  - Rubisco
  - Spider silk
  - Rhodopsin
  - Titin

- Read about ‘Discuss the importance of Proteomes.’ What is its research value?