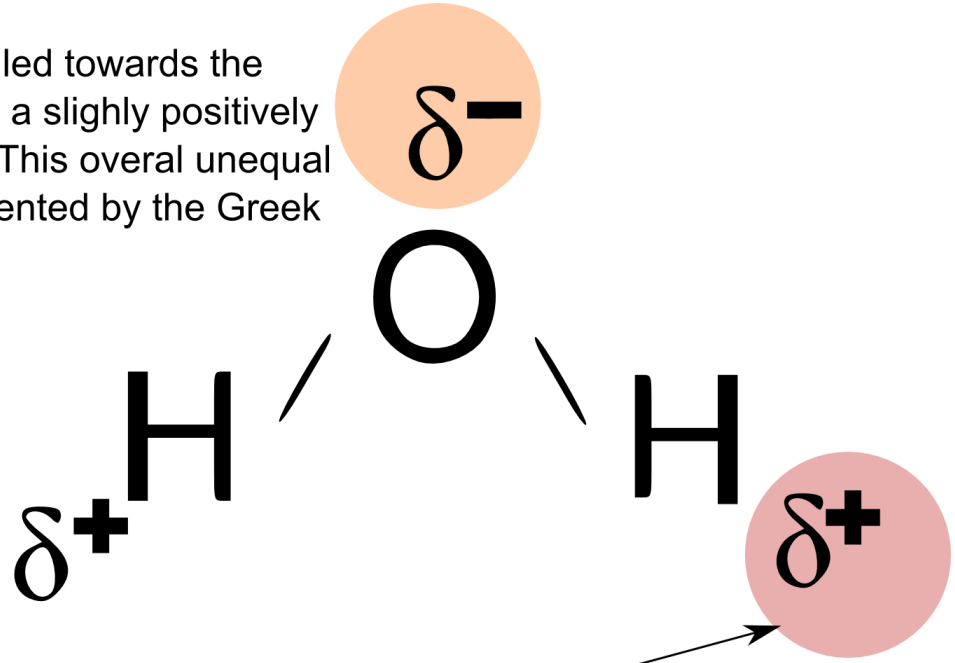
Quick review

Water molecule

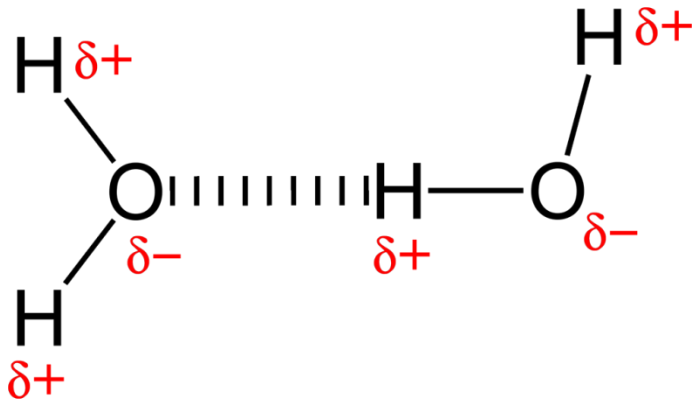
electrons are pulled towards the oxygen, creating a slighly positively charged region. This overal unequal charge is represented by the Greek delta, for dipole



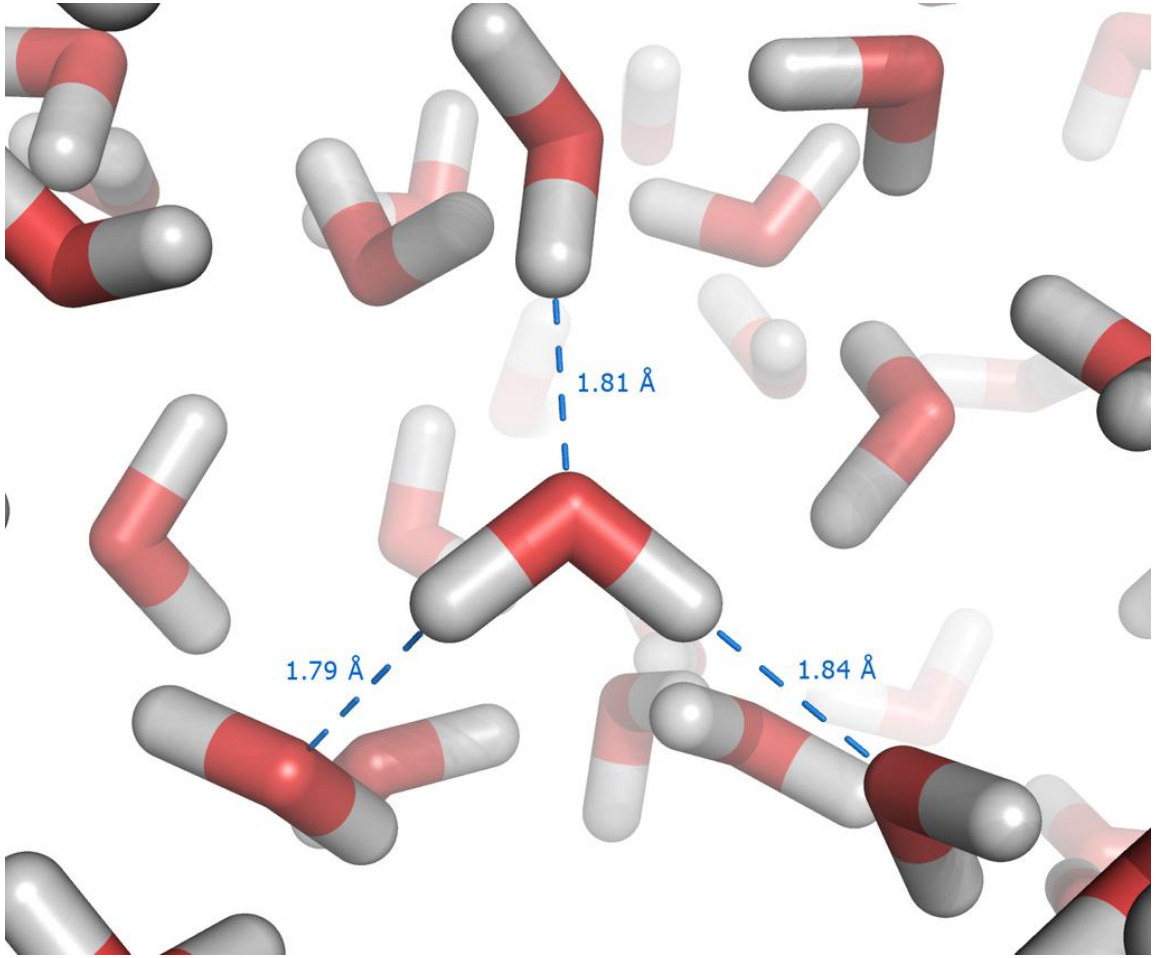
electrons are pulled away from the hydrogen towards the oxygen, creating a slighly positively charged region

Non-covalent bonds

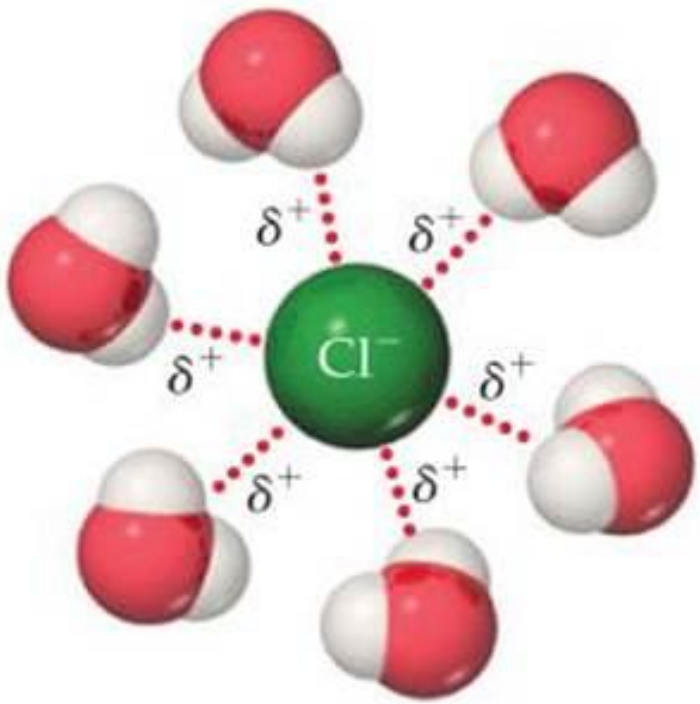
<u>Hydrogen bond</u> - electrostatic attraction between two polar groups. It involves hydrogen (H) atom covalently bound to a highly electronegative atom such as nitrogen (N), oxygen (O), or fluorine (F) .



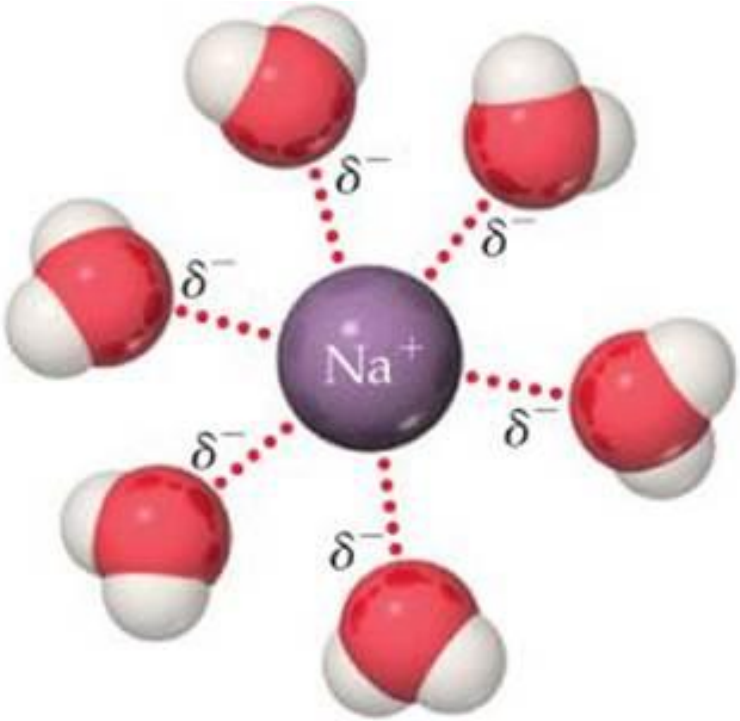
Dynamic hydrogen bonds between molecules of liquid water



Ions in water



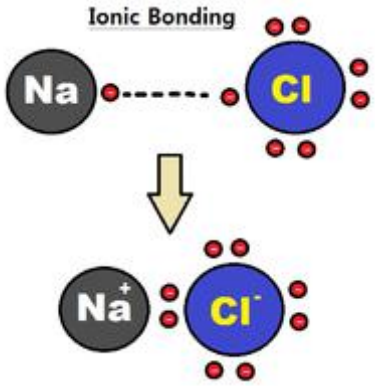
Positive ends of polar molecules are oriented toward negatively charged anion



Negative ends of polar molecules are oriented toward positively charged cation

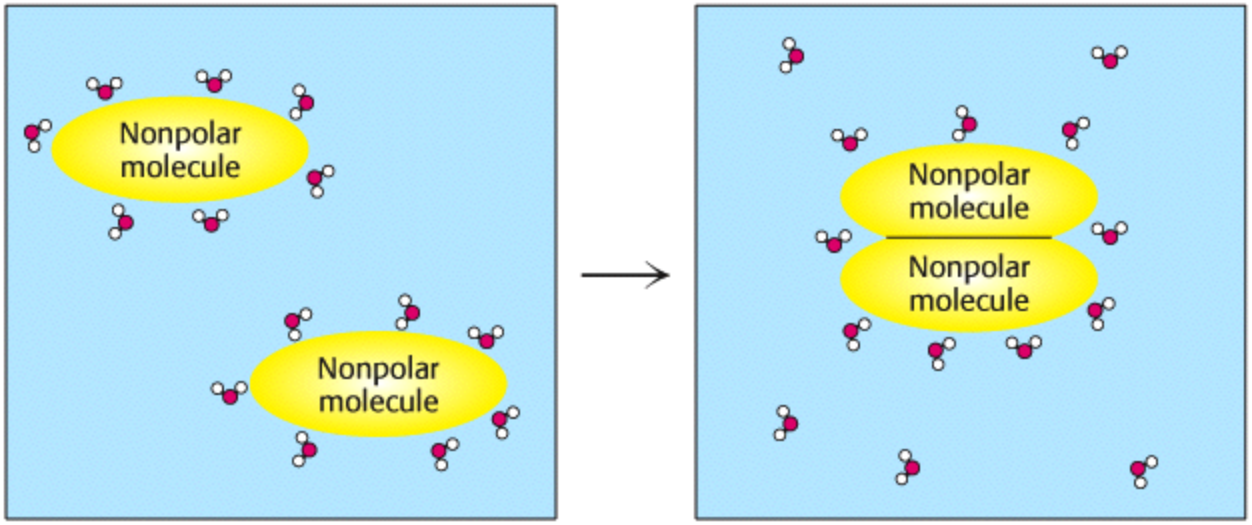
Non-covalent bonds

<u>Ionic bonding</u> - the electrostatic attraction between oppositely charged ions.

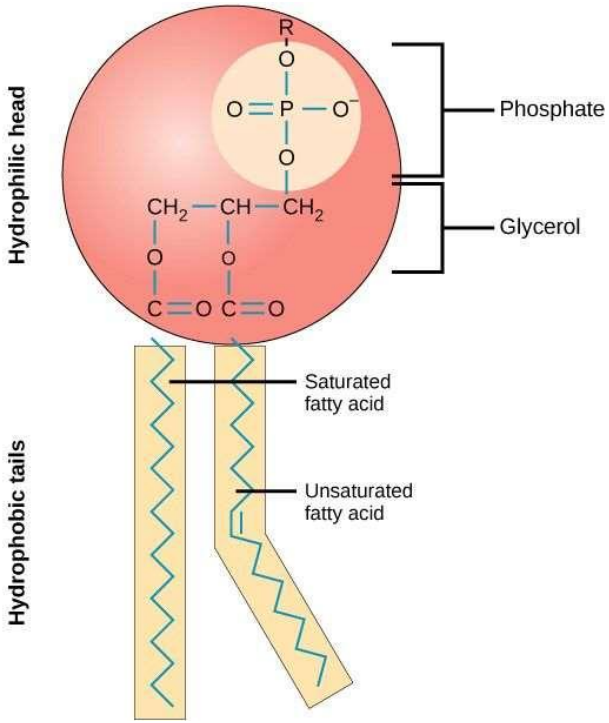


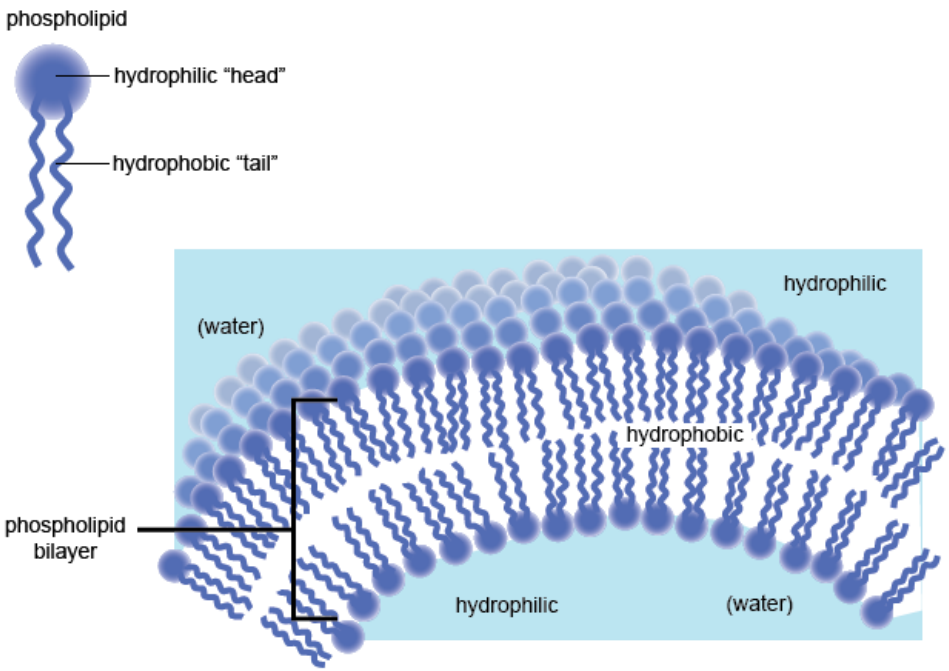
Hydrophobic effect

Non-polar molecules aggregate in aqueous solutions in order to separate from water.



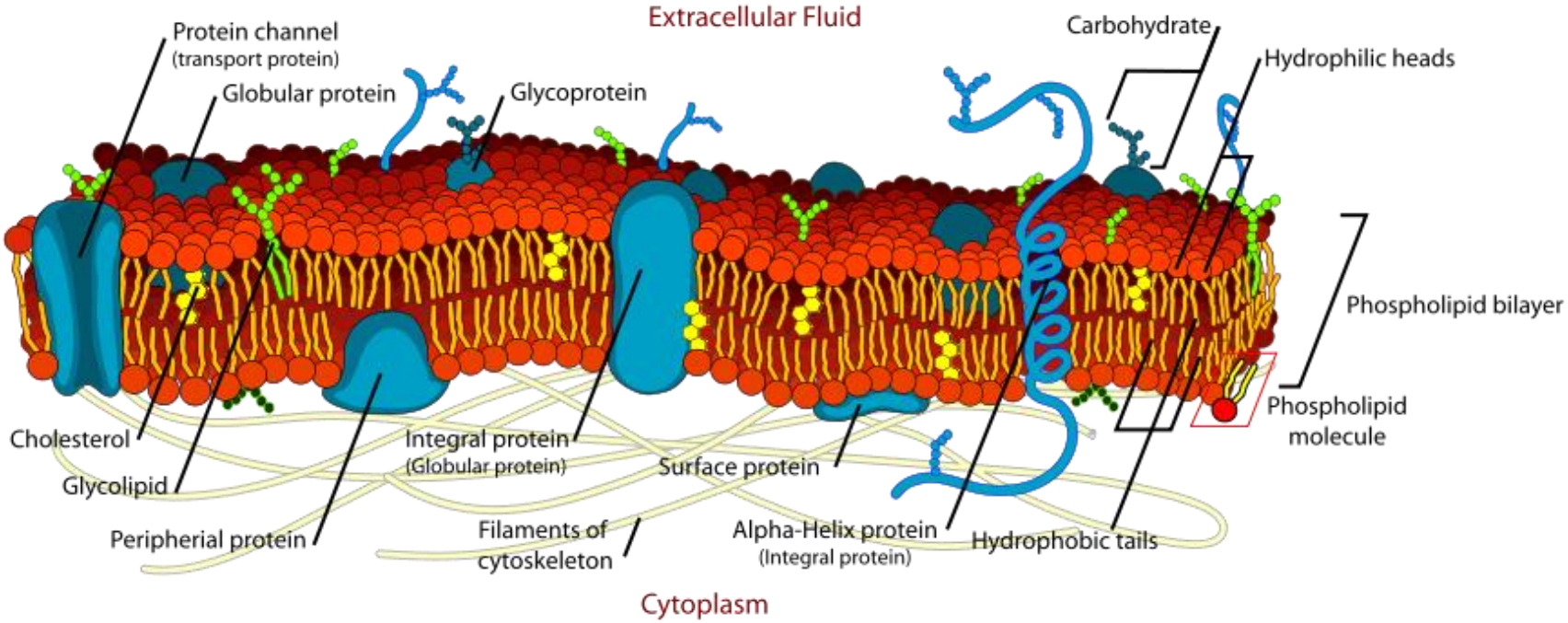
Cell membrane consists of lipid bilayer





- The cell membrane is selectively permeable and able to regulate what enters and exits the cell, thus facilitating the transport of materials needed for survival. The movement of substances across the membrane can be either "passive", occurring without the input of cellular energy, or "active", requiring the cell to expend energy in transporting it. The cell membrane thus works as a selective filter that allows only certain things to come inside or go outside the cell.

A detailed diagram of the cell membrane



PROTEINS

Functions of proteins

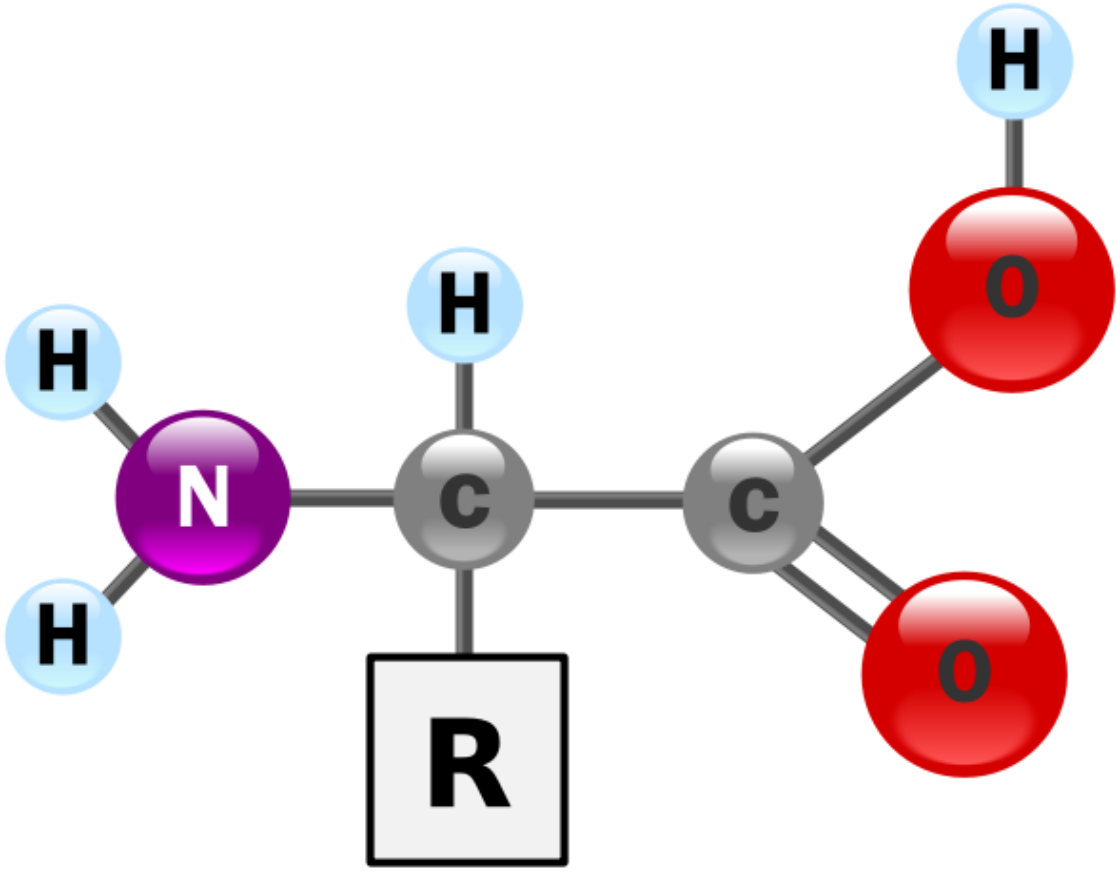
- Proteins are large, complex molecules that play many critical roles in the cell:

1. Enzymes carry out almost all of the thousands of chemical reactions that take place in cells. They also assist with the formation of new molecules by reading the genetic information stored in DNA.
2. Structural component proteins provide structure and support for cells.
3. Transport/storage proteins bind and carry atoms and small molecules within cells and throughout the body

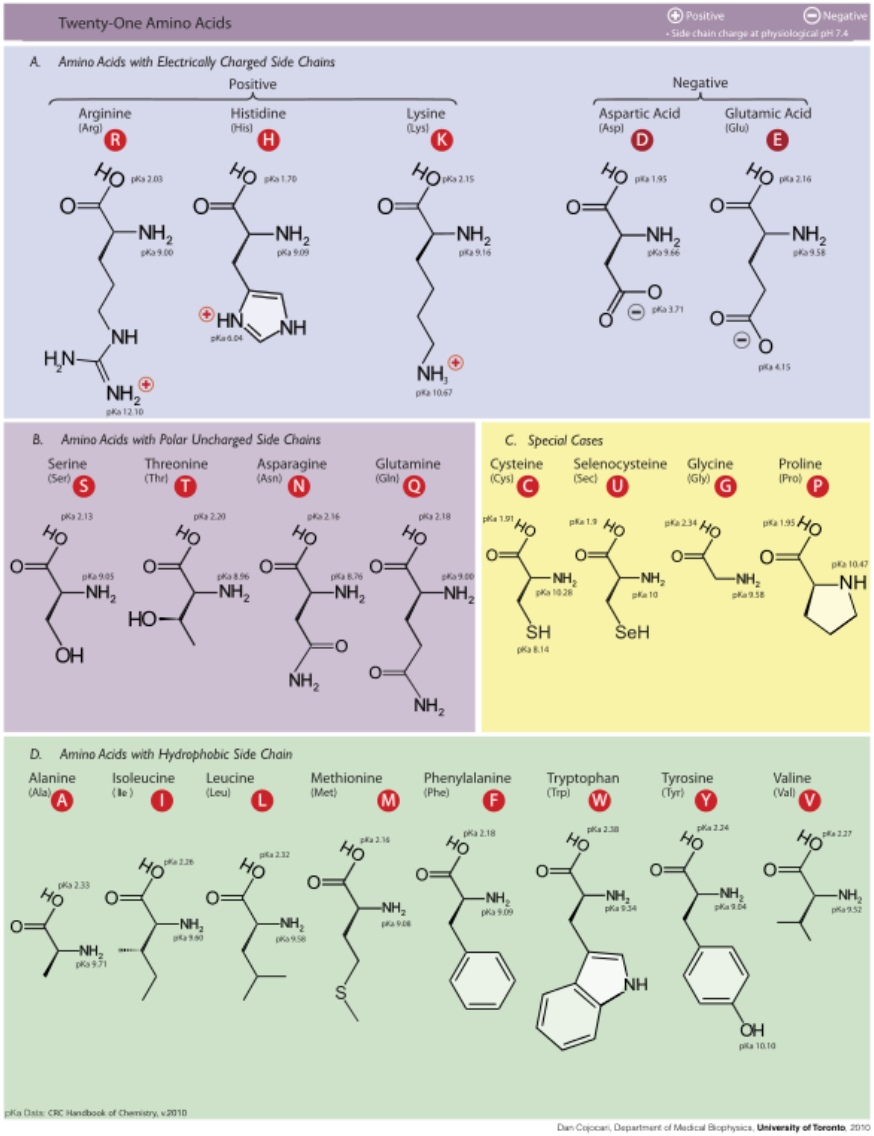
Proteins are composed of amino acids

- Proteins are made up of hundreds or thousands of smaller units called amino acids, which are attached to one another in long chains. There are 20 different types of amino acids that can be combined to make a protein.

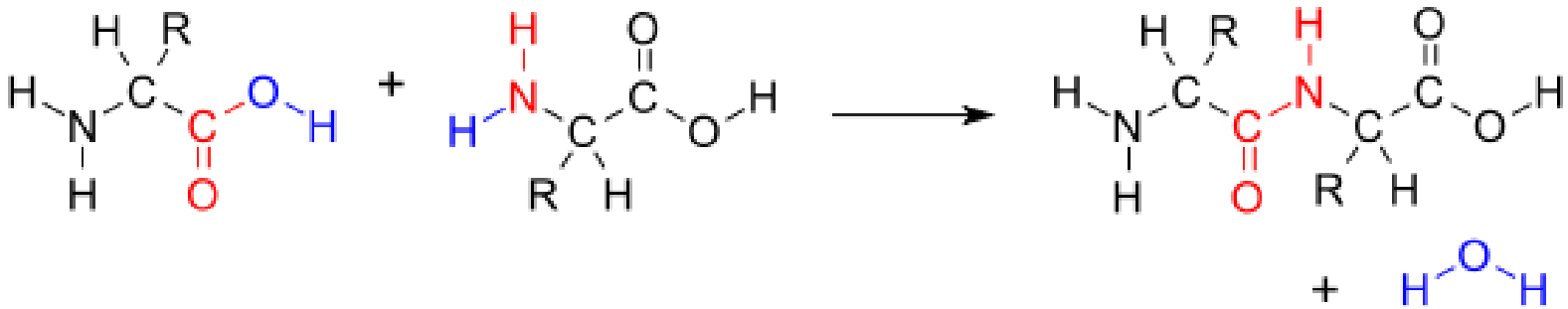
Amino acid



The 20 amino acids



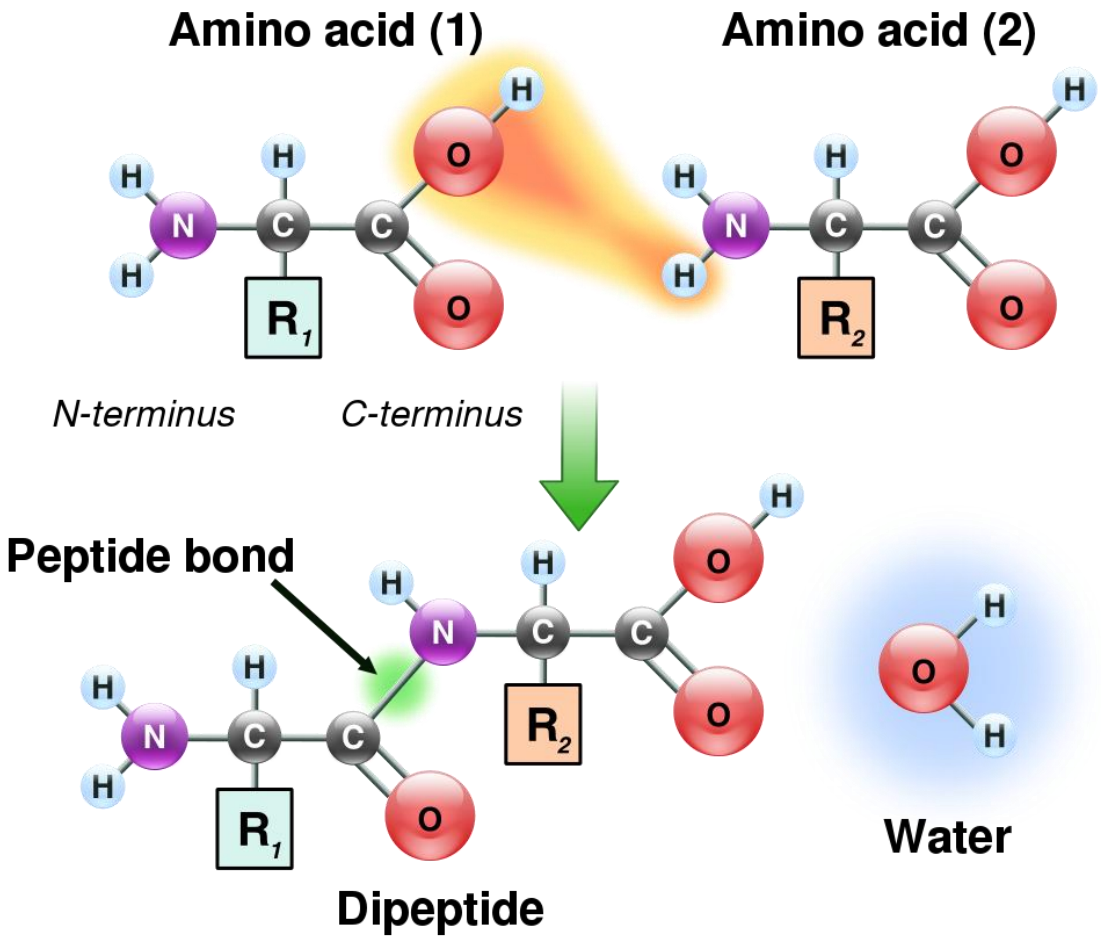
Peptide bond



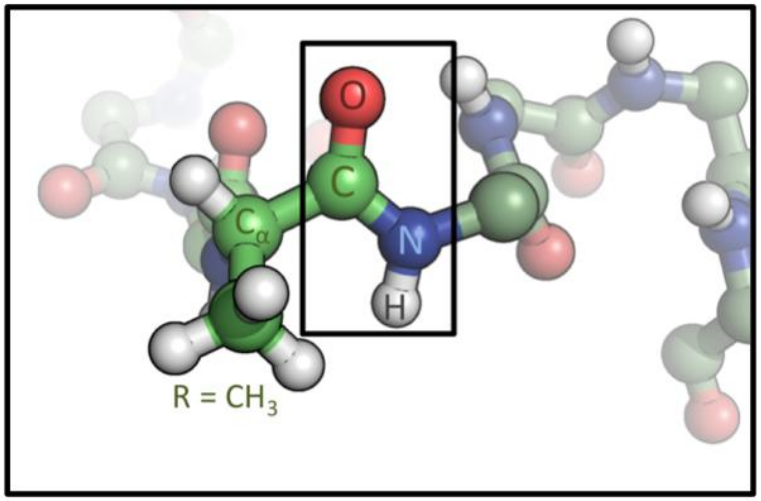
Peptides

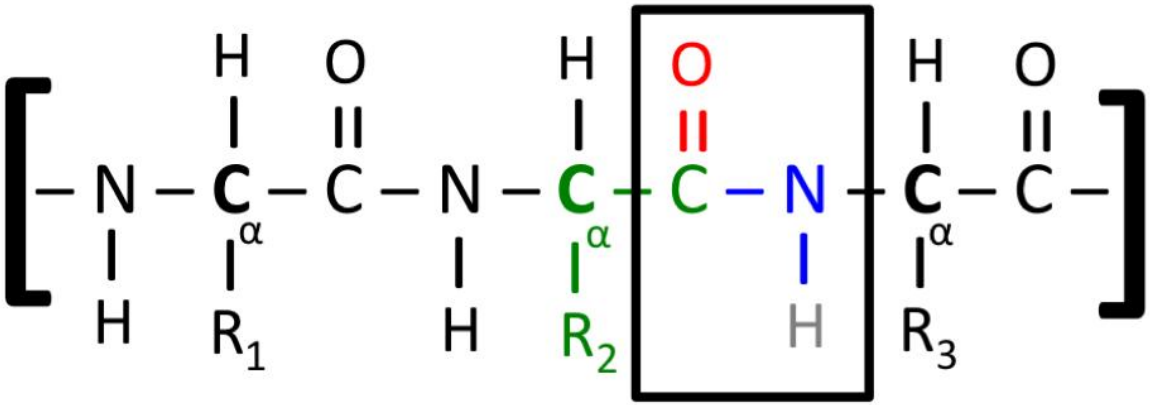
- ***Peptide*** – a molecule consisting of two or more amino acids joined together by peptide bonds.
- Peptides made up of two amino acids are called dipeptides of three amino acids – tripetides, etc.
- Peptides have N-terminus and C-terminus

Peptide bond



Proteins are polypeptides





Protein primary structure

- Protein primary structure is the linear sequence of amino acids in a peptide or protein.
- The sequence of amino acids determines each protein's unique 3-dimensional structure and its specific function.

Primary protein structure