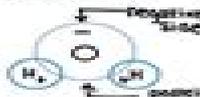


Structure of H<sub>2</sub>O  
hydrogen bonding  
Dimer of H<sub>2</sub>O



# unit one guide

Biological molecules  
proteins  
nucleic acids

H<sub>2</sub>O provides cohesion, adhesion, surface tension, high specific heat, high heat of vaporization, moderate density, and ice floats on water.

hydrogen bonds require lots of energy to change state of matter

CONDENSATION

when H<sub>2</sub>O bonds in products hydrogen and hydroxyl ions, releases pH → more hydrogen

Dehydration → attracted to same  
Hydration → attracted to other  
Hydrolysis → breaking down  
Hydrolysis → breaking down  
Hydrolysis → breaking down

<b>C</b>	<b>H</b>	<b>N</b>	<b>O</b>	<b>P</b>	<b>S</b>
Carbon	Hydrogen	Nitrogen	Oxygen	Phosphorus	Sulfur

more hydrogen bonds → more hydrogen bonding → more cohesion

C → build biological molecules, cell formation  
N → build proteins, nucleic acids  
P → build nucleic acids + lipids

→ make up 98% of organisms

Carbohydrates ↓ C, H, O	Lipids ↓ C, H, O	Nucleic acids ↓ C, H, N, O, P	Proteins ↓ C, H, N, O, S
-------------------------------	------------------------	-------------------------------------	--------------------------------

Dehydration synthesis is the removal of an H<sub>2</sub>O molecule to bond monomers together to create a bond between monomers (condensation)

## Nucleic acid structure:

• the carbon sugar (deoxyribose/ribose), phosphate, nitrogenous base (A, T, C, G), exact shape of strand



## Proteins:

Specific order of amino acids → primary structure

→ 1 group interactions determine structure + function



## PROTEINS

• amino acids bond via a peptide bond (covalent) through dehydration synthesis

• 1 group change can cause a hydrophobic protein to lose the place of a hydrophilic protein

## membranes

• made up of phospholipids  
• create selectively permeable barrier  
• contain phospholipids, cholesterol, and proteins



## LIPIDS

Phospholipid macromolecules

• differences in saturation determine structure and function

• Cells, sterols, phospholipids

• Saturated → no double bonds

• Unsaturated → has double bonds

• Lipids: triglycerides, cholesterol, most of the membrane

• Steroids: hormones, vitamins, cholesterol, maintaining flexibility, embedded into cell membranes, polar region due to phosphorus and fatty acid



## Amino Acids: have directionality

• linear chains, connected by covalent bonds

• amino end and carboxyl end

## DEHYDRATION SYNTHESIS



## Chaperones:

• protein molecules that assist protein folding

## PROTEIN STRUCTURE

• Primary: sequence of amino acids, specific order determine protein shape

• Secondary: how folding of chain into alpha helix and beta sheet occurs

• Tertiary: 3-D shape, hydrogen bonds, disulfide link, ionic bonds, hydrophobic interactions

• Quaternary: interactions between multiple polypeptide chains

## + FUNCTION

• Enzymes → speeds up reaction rates in the cell

• Cell structure → part of the cellular membrane

• Communication between cells

## DENATURATION:

• the protein starts to lose its shape/structure when (bonds break)

• Temperature change  
• pH of surrounding area  
• Salt concentration

NH<sub>2</sub> = Amino  
COOH = Carboxyl

## NUCLEIC ACIDS

• add new nucleotides to the 3' end

• two nitrogenous bases: purine + pyrimidine

• pyrimidine is single ringed, purine is double

• Antiparallel double helix

• 5' on phosphate end, 3' on hydroxyl end

• both back and forth have nitrogenous bases (purines) + sugar-phosphate backbone

## ANTIPARALLEL

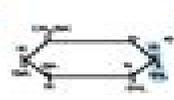


## ALDOSE VS KETOSE

• contains aldehyde functional group

## ALPHA VS BETA

• contains ketone functional group



## ALPHA VS BETA

• all monomers are in the same orientation

## ALPHA VS BETA

• Every glucose monomer is upside down from its neighbor

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**Thirumalaisamy P.  
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