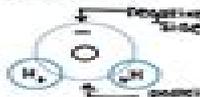


Structure of H<sub>2</sub>O  
hydrogen bonding  
Denser at 4°C



# unit one guide

Biological molecules  
proteins  
nucleic acids

H<sub>2</sub>O provides cushion, adhesion, surface tension, high specific heat, high heat of vaporization, variable density, profile changes, thermal stability

hydrogen bonds require lots of energy to change state of matter

CONDENSATION

when two molecules combine, produces hydrogen and hydroxyl ions, releases H<sub>2</sub>O  
 Obedience → attracted to same  
 Attraction → attracted to other  
 Repulsion → hydrogen bonds  
 Repulsion → hydrogen bonds  
 Repulsion → surface of one liquid  
 Cohesion → surface of one liquid

THIS GONNA when ions → water expands due to hydrogen bonding, molecules want to stay together

<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 → protein formation  
 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, P	Nucleic acids ↓ C, H, N, O, P	Proteins ↓ C, H, N, O, S
-------------------------------	---------------------------	-------------------------------------	--------------------------------

Condensation 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:

• One carbon sugar (deoxyribose/ribose), phosphate, nitrogenous base (A, T, C, G), exact copies of strands



Starch, glycogen  
 Glycogen → 1-4 glucose  
 Cellulose → 1-4 glucose  
 Chitin → 1-4 glucose

## 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 changes 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



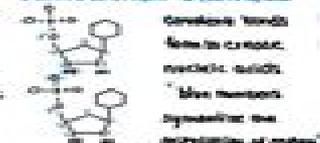
Phospholipid macromolecules  
 • differences in saturation determine structure and function  
 • Cells, sterols, phospholipids  
 • Saturated → no double bonds  
 • Unsaturated → has double bonds  
 4 in 1: triglycerides, cholesterol, make up the membrane  
 Steroids: cholesterol, steroid hormones, sex hormones, vitamin D, steroid hormones  
 Phospholipids: maintain fluidity, emulsify fats up cell membranes, polar region due to phosphate and fatty acid



## Amino Acids:

• have directionality  
 • linear chains, connected by covalent bonds  
 • amino end and carboxyl end

## DEHYDRATION SYNTHESIS



covalent bonds form to create nucleic acids  
 • the number specifies the structure of water

## 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  
 • base 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



## Chaperones:

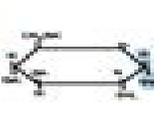
• protein molecules that assist protein folding

## ALDOSE VS KETOSE

• contains aldehyde functional group

## ALPHA VS BETA

• contains ketone functional group



## ALPHA VS BETA

• all monomers are in the same orientation  
 • Every glucose monomer is upside down from its neighbor

# Ap Biology Chapter 12 Notes

**Roman Wölfel**



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