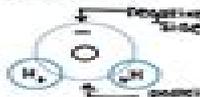


Structure of H<sub>2</sub>O  
hydrogen bonding  
Denser at 4°C



# 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, greater density when frozen.

THIS GENE: when ions → water expands due to hydrogen bonding, molecules next to each other.

hydrogen bonds require lots of energy to change state of matter

CONDENSATION → when two molecules → products, hydrogen and hydroxyl ions, releases H<sub>2</sub>O

Hydroxyl → attracted to same  
Hydrogen bond → attracted to other  
Hydroxyl group → hydrogen bonding  
Hydroxyl group → hydrogen bonding  
Hydroxyl group → hydrogen bonding

<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 bonding → more hydrogen bonding  
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 → the removal of an H<sub>2</sub>O molecule to bond monomers

## Nucleic acid structure:

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



Starch vs Cellulose  
Starch → α glucose  
Cellulose → β 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 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



Amino Acids: have directionality

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

## 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 int.  
• 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:

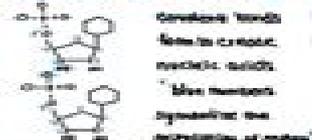
• the protein starts to lose its shape/structure when (bonds break)  
• Temperature change  
• pH of surrounding area  
• Salt concentration

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

## DEHYDRATION SYNTHESIS



## Chaperones:

• protein molecules that assist protein folding

## 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  
• Every glucose monomer is upside down from its neighbor



# Ap Biology Chapter 12 Notes

**S Marginson**



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