CHEMICAL BASIS OF LIFE

Reading: Chapter #2

(8th edition p. 37 – 44)
(9th edition p. 39-46)

CHEMICAL BASIS OF LIFE

INORGANIC MOLECULES: -water

-oxygen

-carbon dioxide

-salts

ORGANIC MOLECULES: -proteins

-carbohydrates

-lipids

-nucleic acids (DNA, RNA)

-ATP

Inorganic Molecules

-atoms with +/- charge

-dissolve in water *or* react w/ water to release ions

Example: salts

Inorganic Molecules

1) **Water (H_2O) ~ 2/3 of the body**

<u>4 main functions</u>:

a) Solvent → chemicals dissolve in water

b) Lubricant →

c) Transporter → *examples*

d) Temperature regulation →

Inorganic Molecules

2) Oxygen (O_2)

-obtained by _____

-transported in blood by _____ in the _____ cells.

-needed to release energy in aerobic metabolism

3) Carbon Dioxide (CO_2)

Glucose + O_2 → CO_2 + H_2O + heat + ATP

Inorganic Molecules

4) Salts:

Provide ions for: -Muscle Contraction

-Nerve Impulse Conduction

Examples of ions: -atoms with a + or – charge

-Na^{+}, K^{+}, Ca^{++}, Mg^{+}…

Organic Molecules

-Contain carbon and hydrogen

Examples: **-proteins**
-carbohydrates (CHO)
-lipids
-nucleic acids
-ATP

Organic Molecules

1) Proteins

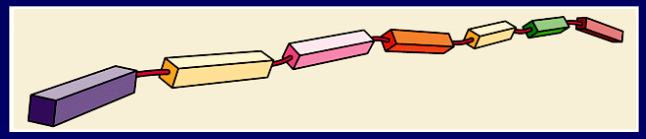
Functions: **-structural components (*example* = ___)**

-enzymes

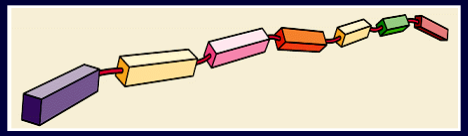
-hormones

-receptor sites of cell membranes

-energy source



Organic Molecules



1) Proteins

a.a – a.a. – a.a. – a.a. – a.a. – a

Structure: -Polymer (repeating unit) of amino acids (a.a.)

-Primary Structure = Sequence

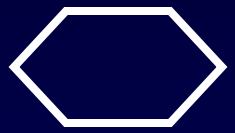
-Secondary Structure = Shape (coil)

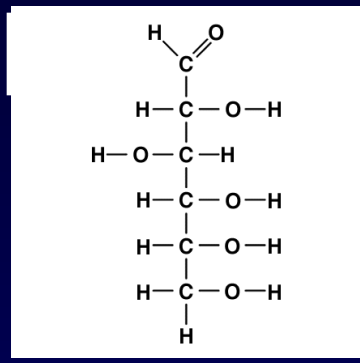
-Tertiary Structure = 3D Shape

-Quaternary Structure = Combo of 2 + chains

Organic Molecules

2) Carbohydrates





Structure:

-*Carbo* = from carbon; *Hydrates* = from water

-Formula = $\mathbf{C_n(H_2O)_n}$

-draw as a chain or as a ring

Function: **-Energy Source**

-*Example:* **glucose (monosaccharide)**

starch or glycogen

(polysaccharide)

Organic Molecules

3) Lipids

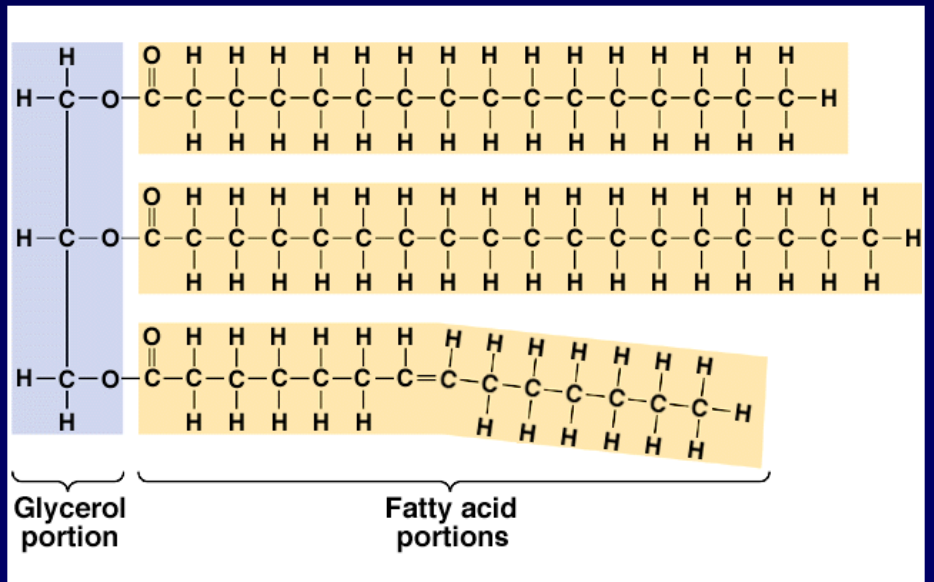
- insoluble in water

Examples: triglycerides, phospholipids, steroids

Organic Molecules (lipids)

a) triglycerides

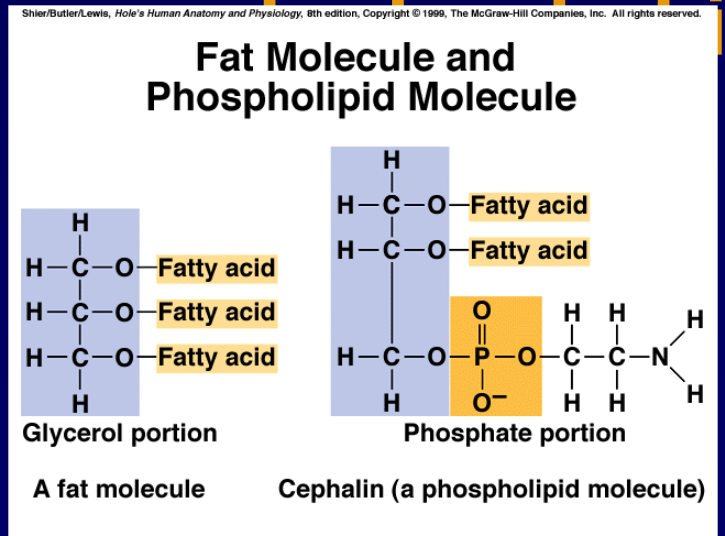
- neutral fats (1 glycerol + 3 fatty acid chains)
- energy storage, insulation and protection

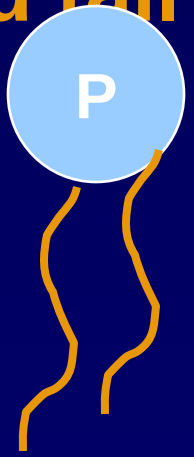


Organic Molecules (lipids)

b) phospholipids

- they have a phosphate attached
- important components of cell membranes
- **hydrophilic phosphate head**
- **ic fatty acid tail**



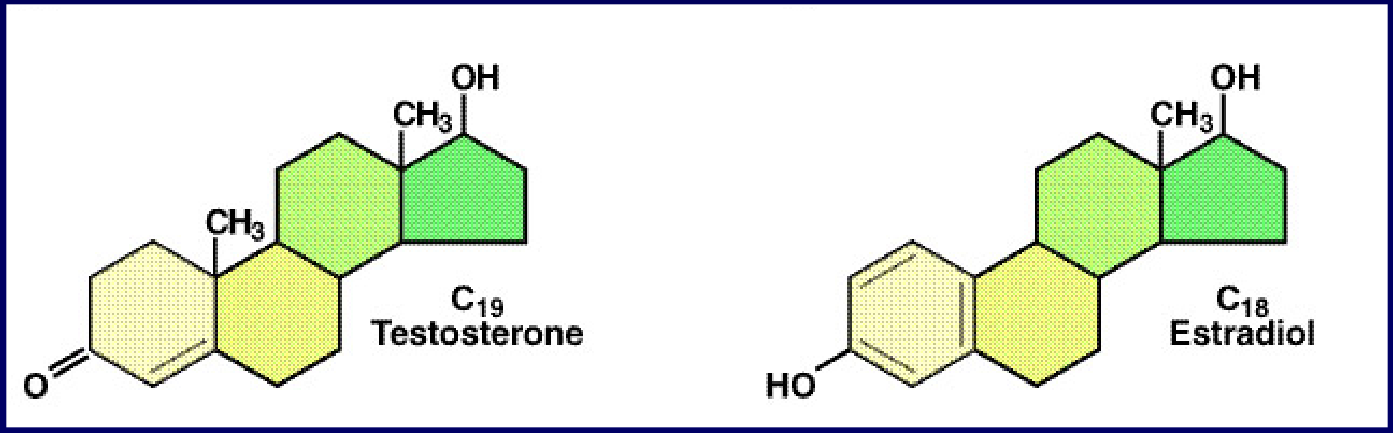


Organic Molecules (lipids)

c) steroids

- 4 ring structure
- important components of cell membranes
- structure of some hormones

Examples: cholesterol, testosterone, estrogens



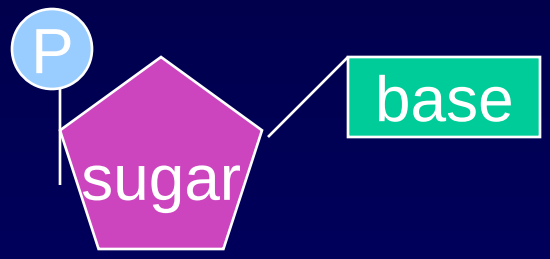
Organic Molecules

4) Nucleic acids

DNA = Deoxyribonucleic acid

Sugar = deoxyribose

Molecular code for life



RNA = Ribonucleic acid

Sugar = ribose

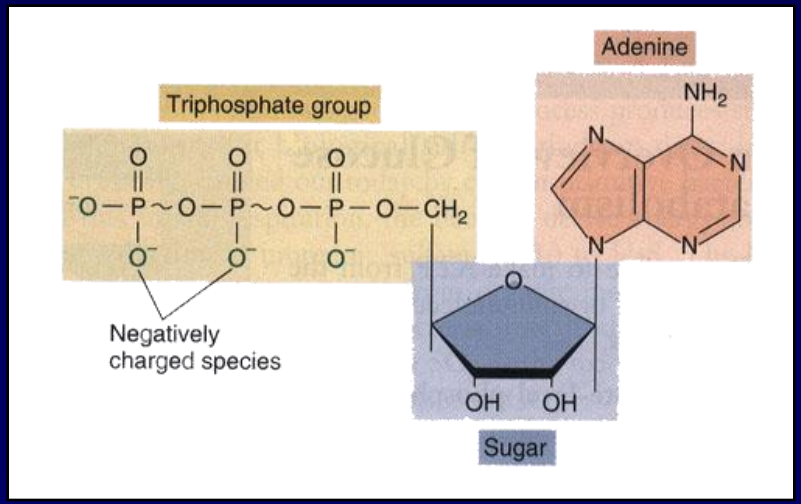
Intermediate molecule, between DNA & protein

Organic Molecules

5) ATP = adenosine triphosphate

Function: Energy currency for cells

Structure:



End of Chemistry

(go to cells)