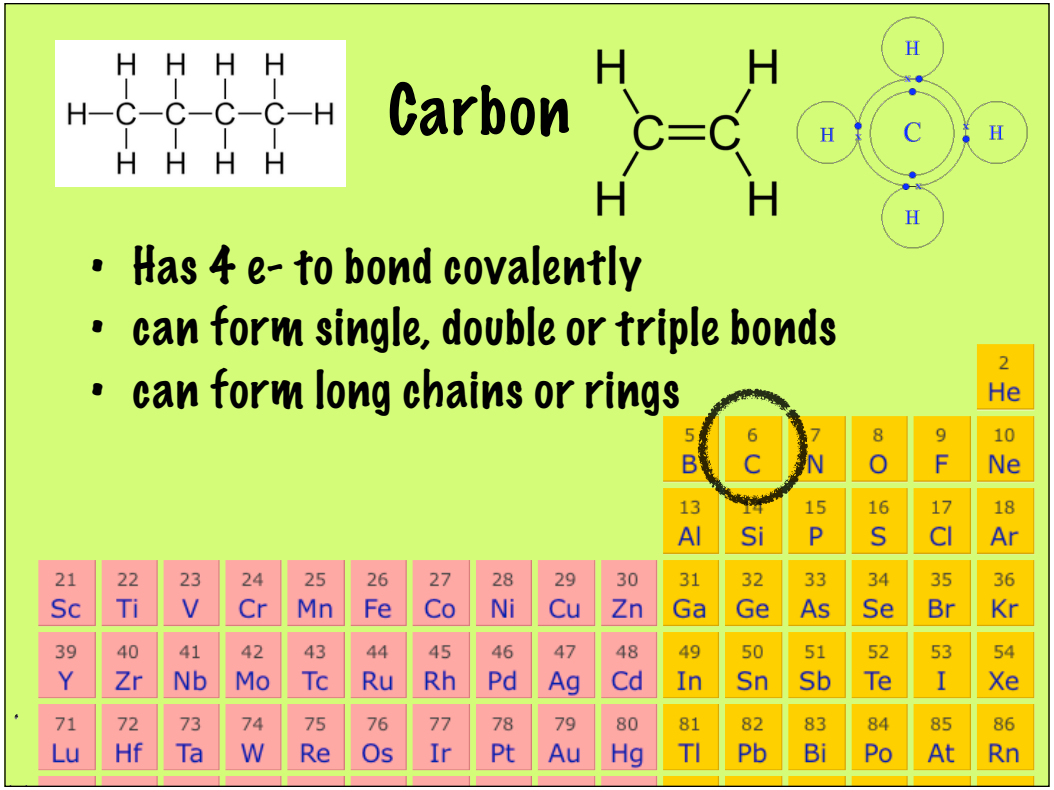
# Life Substances

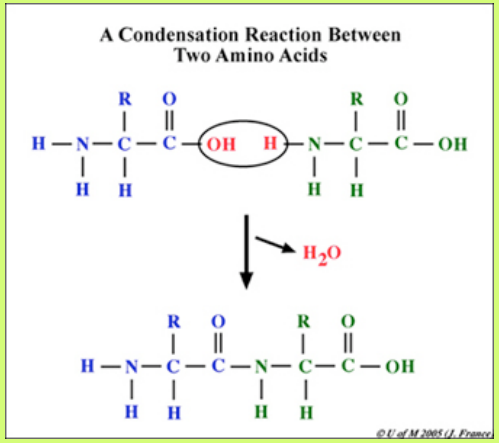
# Organic Molecules
# CHON & PS



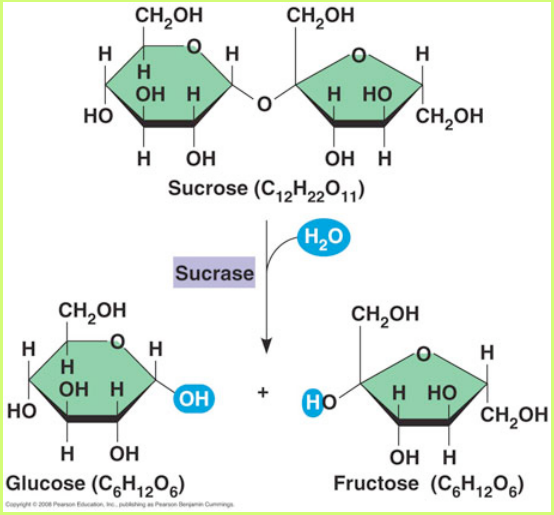

How many e-s in outer shell? 4 e-. Needs 4 more to become stable. needs to share electrons

# Polymers

- **Condensation** links together subunits
- Macromolecules
- 1. Carbohydrates
- 2. Lipids
- 3. Proteins



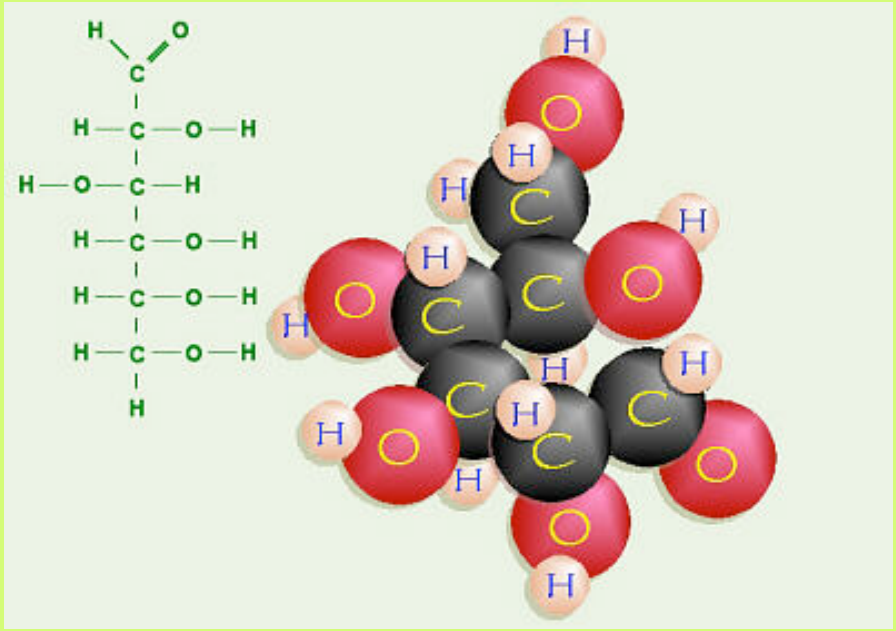
# Hydrolysis: put water back in to break bonds



# 1. Carbohydrates

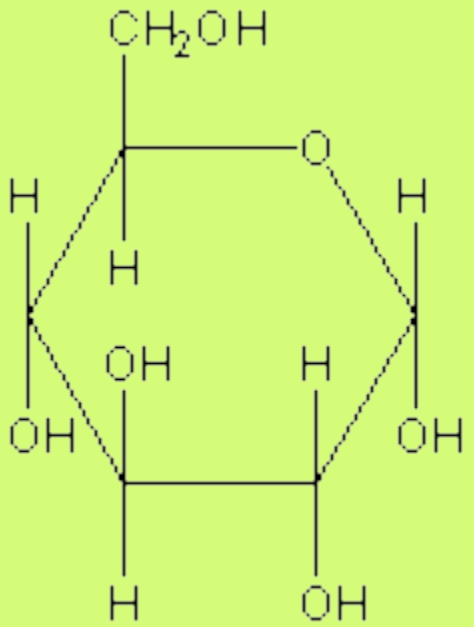
- Sugars and starches
- Quick Energy
- CHO

Which has more energy, carbs or fats?



Monosaccharide or Disaccharide?

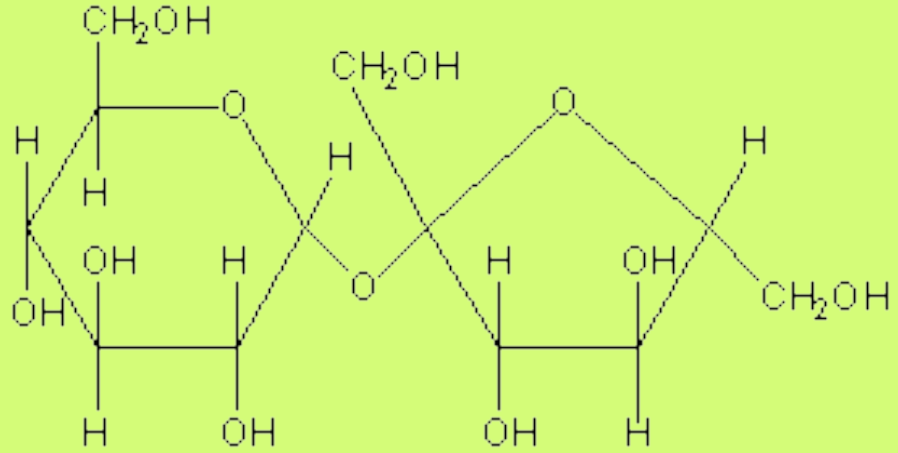
- Monosaccharide-one sugar
- EX: Glucose, Fructose, Galactose



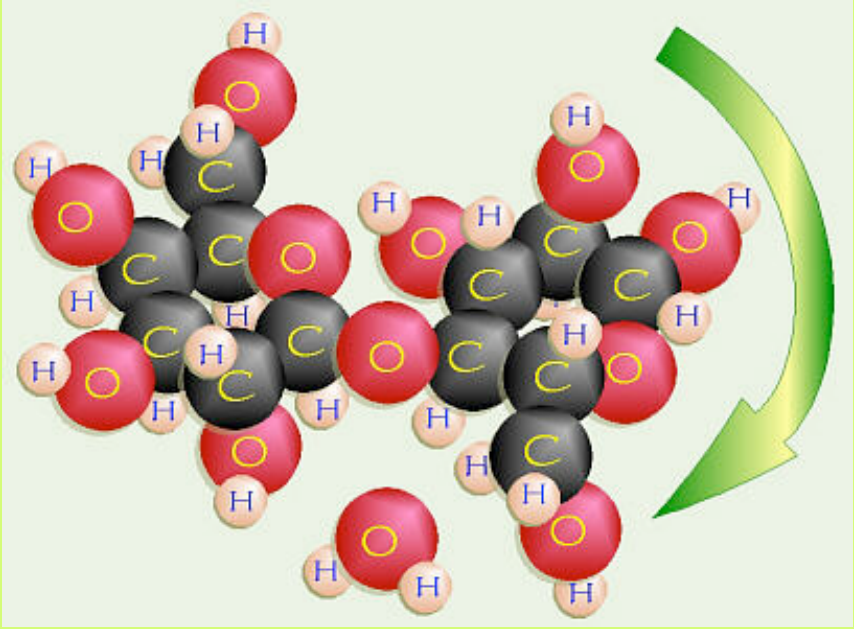

What elements are in this?

How many servings should you have each day?

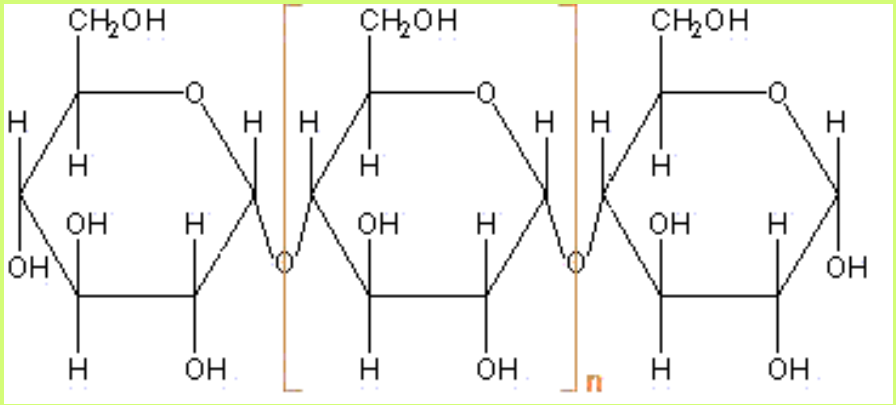
# Dissacharide: 2 sugars
# Glucose + Fructose = Sucrose




What happens when your body uses all of its sugar for energy?



What do you put back in to break the bonds?




What is taken out to bond these sugars together? What is the process called?

# Polysaccharides

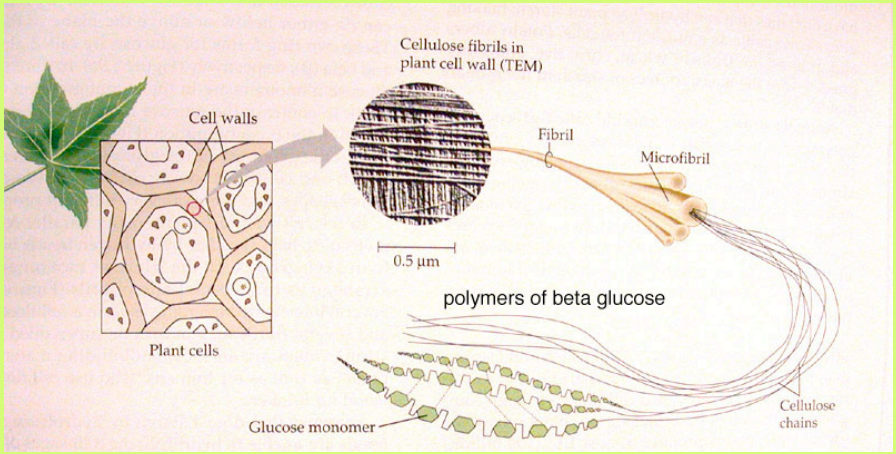
- long chains of monosaccharides
- Energy storage
-

- Starch:  bread, pasta, potatoes

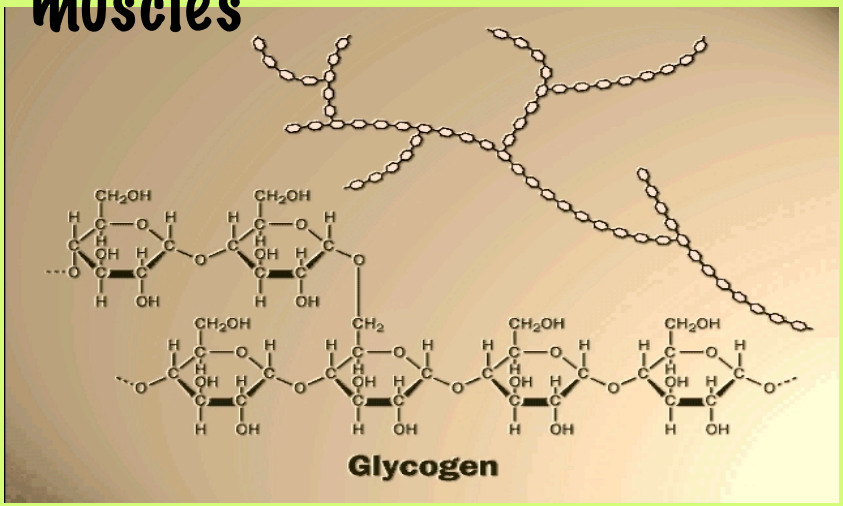

Starch or Glycogen?

How many servings of grains should you have each day?

# • Cellulose: plants only



- Glycogen: in animals, produced and stored in liver, muscles

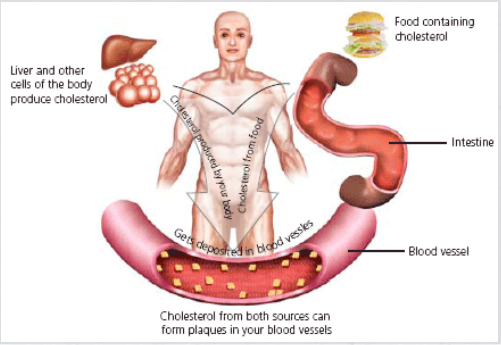


# 2. Lipids

Limit to 30% of total calories

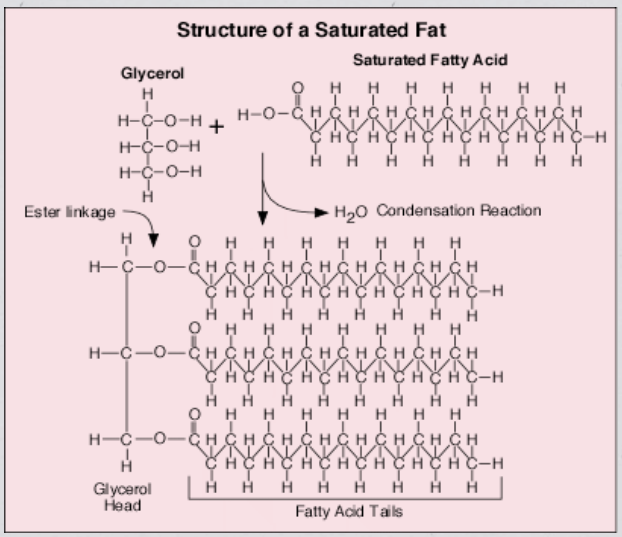
* CHO
* Waxes, oils, fats, cholesterol

30% of 2,200 calories/day = 660 calories from fat



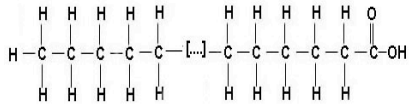
# 2. Lipids

* Glycerol attached to 3 fatty acids



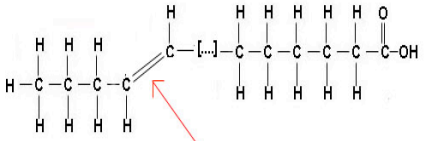
Saturated fats = Filled with Hydrogens

SATURATED FATTY ACID



Unsaturated fats = Not filled with Hydrogens

UNSATURATED FATTY ACID



One or more double C=C bonds present in the fatty acid.
This puts a 'kink' in the molecule

# Saturated Fats

- Solid
- Raises cholesterol
- whole milk, butter, animal fat

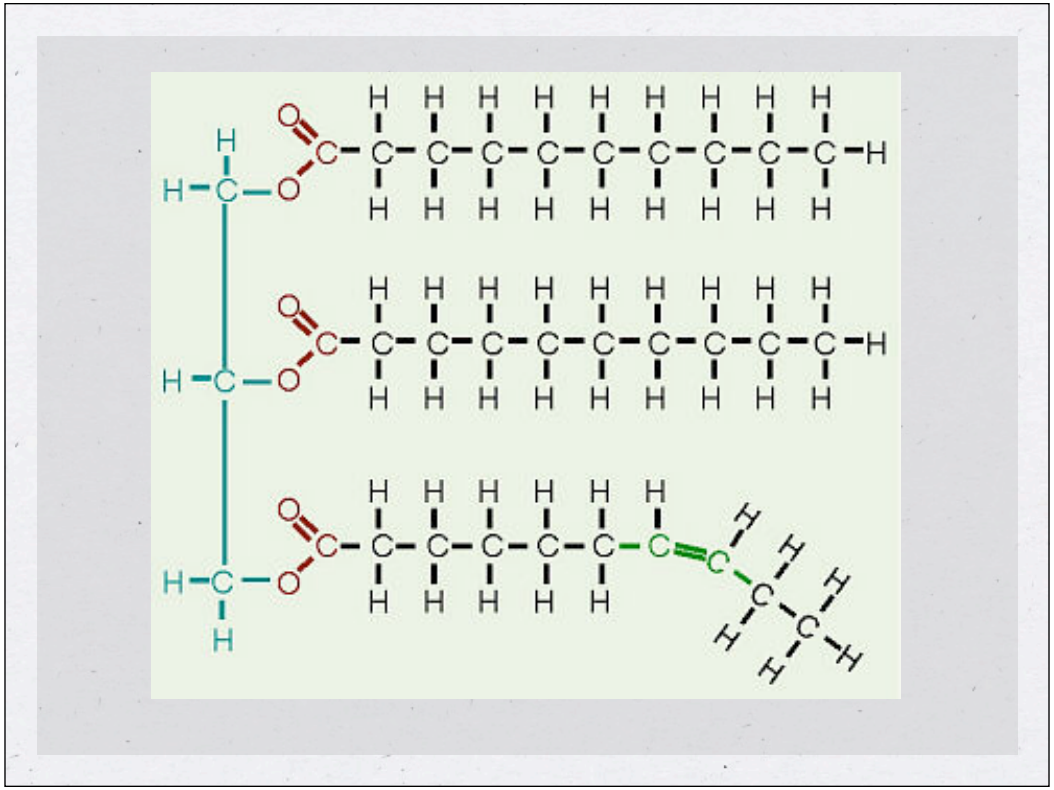
Transfats are really bad!

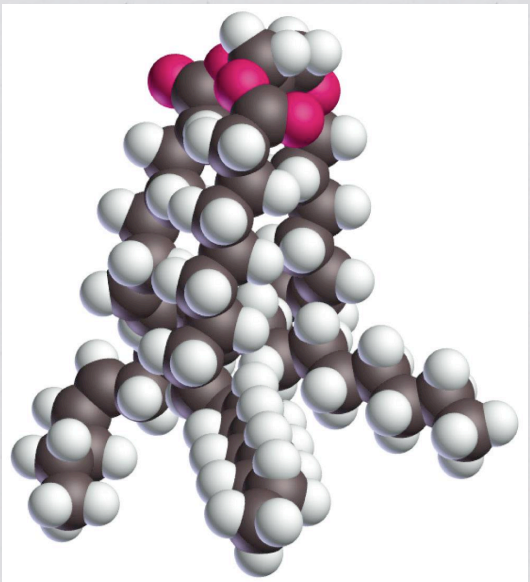
# Unsaturated Fats

- Liquid
- Helps decrease cholesterol
- Oils, avocados, fish

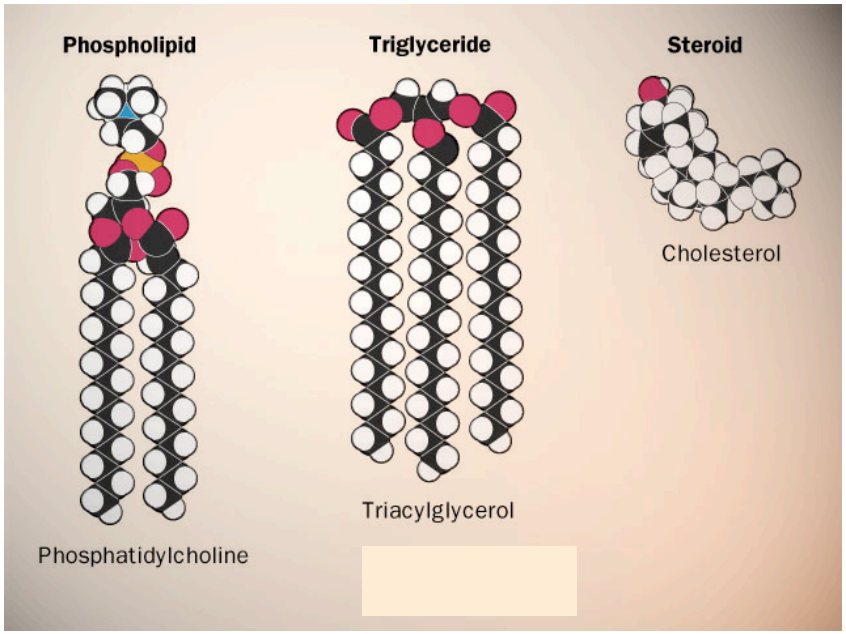
# Unsaturated

- Polyunsaturated - many double bonds
- Monounsaturated - one double bond
- Which would be more solid?



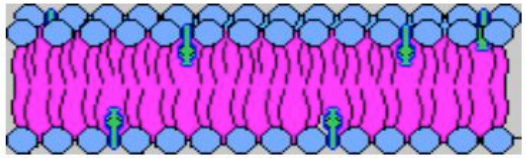


Is this saturated or unsaturated?

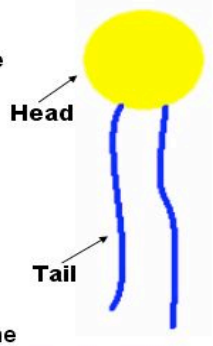

Phospholipid
Triglyceride
Steroid
Cholesterol
Triacylglycerol
Phosphatidylcholine

# Uses: Cell Membranes

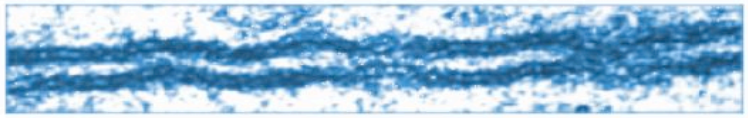
Arrangement of phospholipids into a membrane



Phospholipid




Electron micrograph of a cell membrane

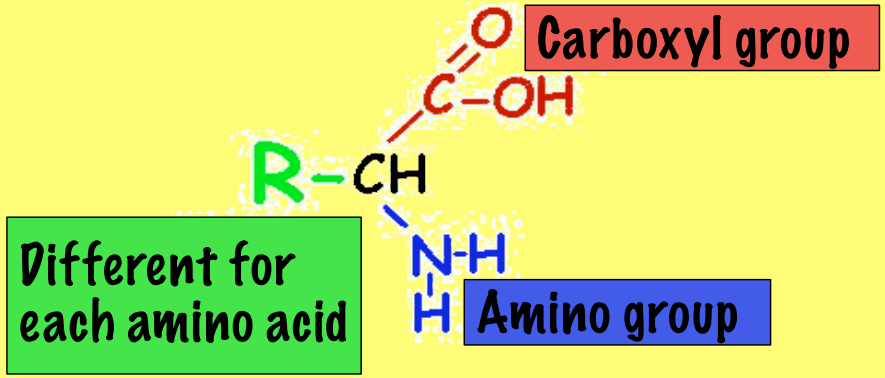


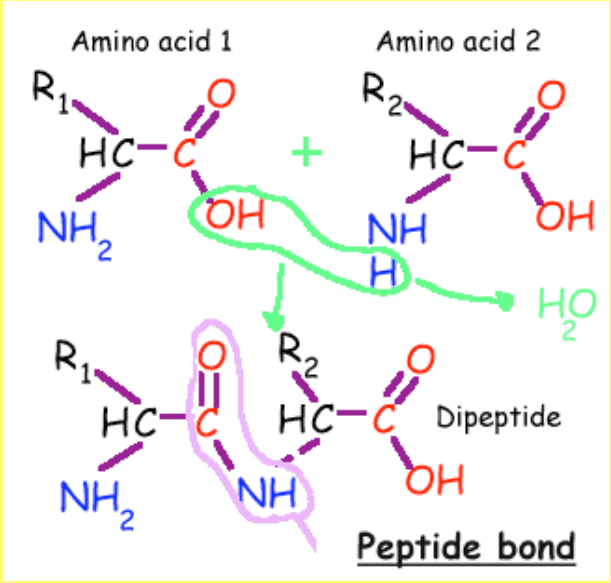
## Uses

- Adipose fat : Sat. Fat
- Insulation
- Energy (2X carbs)
- Hormones
- Oil keeps arctic fish flexible
- Waxes: waterproof

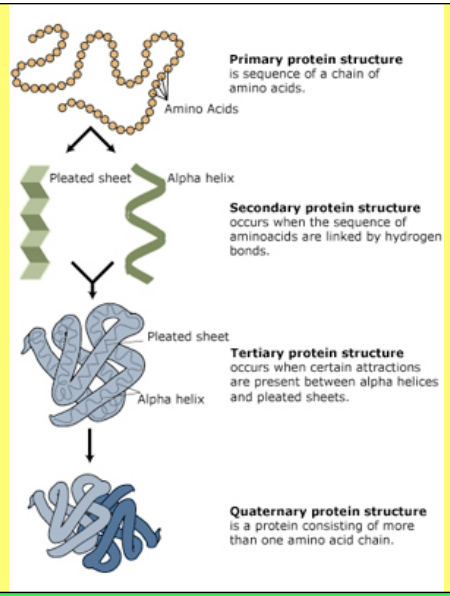
# 3. Proteins

- CHON & S





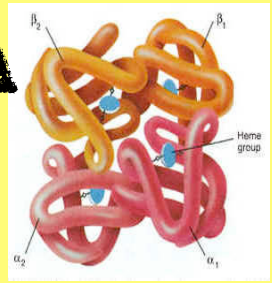

**Amino acids join by taking water out, called a Peptide bond**




**Polypeptide: many amino acids connected to make a protein or enzyme**

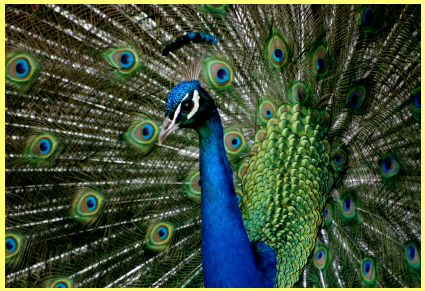
# Uses

- Insulin: regulates blood sugar
- Hemoglobin: transports $O_2$

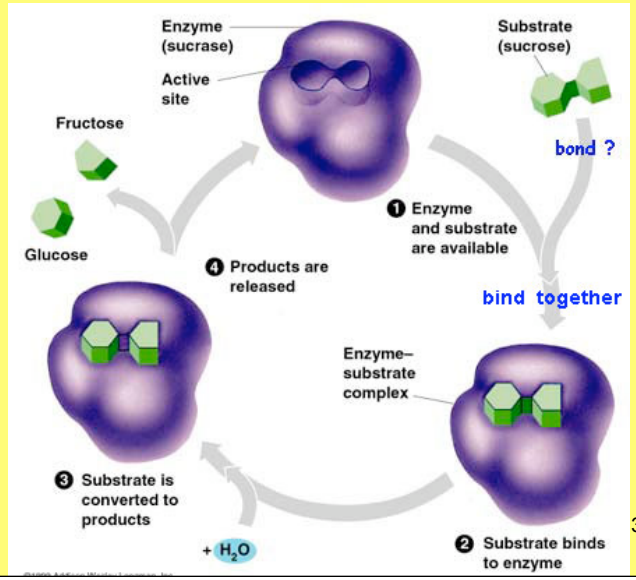


# Uses

- Feathers, hair (keratin), muscle, eyes, eggs, nuts



# Enzymes: speed up chemical reactions

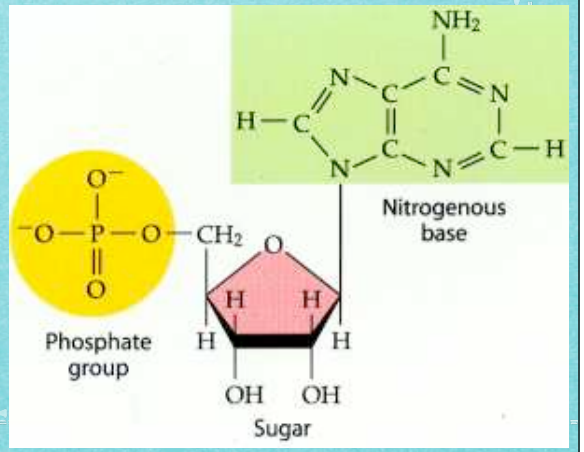


# 4. Nucleic Acids

- C, H, O, N, and Phosphorus
- Store Genetic Info, instructions for proteins
- DNA (Deoxyribonucleic acid) & RNA (Ribonucleic acid
- Made of Nucleotides

# Nucleotide

- 3 Parts:
- 1) Sugar
- 2) Phosphate group
- 3) Nitrogen bases



# DNA