

## Chapter 3: Biochemistry

Define organic compounds

Monomer – simple carbon compounds &

Polymer – monomers bonded together

### Macromolecules

#### A. Carbohydrates

##### 1. Monosaccharides – Benedict Solution Test (blue to brownish red ppt)

- Example: blood sugar (glucose) fructose, galactose, maltose  $C_6H_{12}O_6$

Insulin: a protein (hormone) that stimulates the cells to take up glucose.

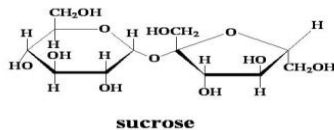
Type I diabetes: immune system attack pancreas that makes insulin (fatal)

Type II diabetes: pancreas cannot keep up with the demands for insulin

→sugar is not readily taken up by the cells so you are tired.

##### 2. Disaccharide

- Example: table sugar (glucose and fructose), lactose in milk (glucose and galactose)
- Bond formed by condensation reaction(or dehydration synthesis) = loss of water

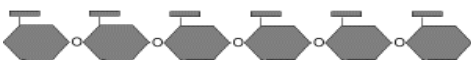


##### 3. Polysaccharides

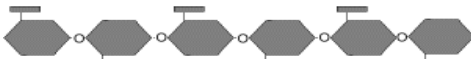
Break down of complex molecule is done by hydrolysis reaction ( addition of water)

- Example:
  - a. Glycogen (chain of glucose used for quick release of energy) – carb load night before a long race or competition
  - b starch and cellulose (plant store carbs this way) Starch is in form of a lot like glycogen but branched and cellulose is what makes up wood.

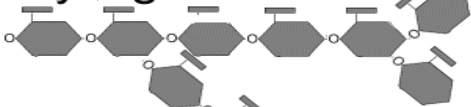
#### Starch



#### Cellulose

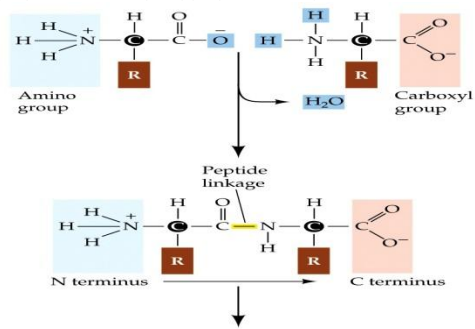


#### Glycogen



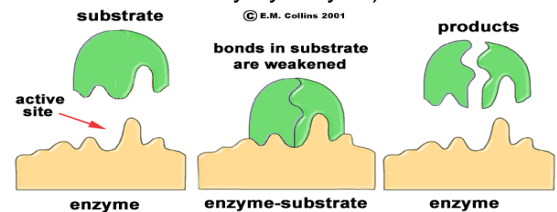
#### B. Proteins – Biuret solution

##### 1. Dipeptides and polypeptides (=protein)

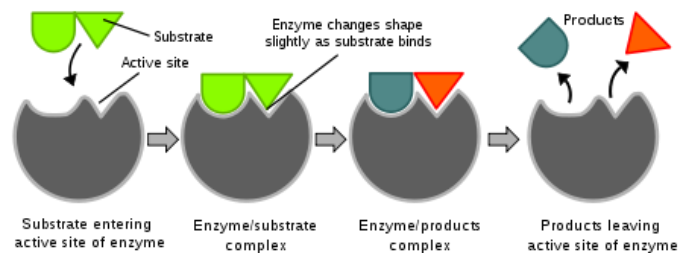


##### 2. function is determined by shape of protein

- a. storage, structure, signal, contractile, defensive, enzyme, transport, transcription regulatory.
  - b. enzymes speed up chemical reactions by lowering activation energy
- lock in key model (substrate bind to the enzyme and breaks down by hydrolysis)



##### - induced fit model



#### C. Lipids (fats and oil) – Sudan IV solution

1. Fatty acid and glycerol are building blocks of lipids (do not dissolve in water)
  - long term energy storage (larger number of C & H bonds than carbs)
2. Triglycerides: 3 fatty acids and 1 glycerol (vegetable oil and animal fat)
3. Phospholipid: 2 fatty acids and 1 glycerol (cell membrane)
4. Steroid: not fatty acid but four fused carbon rings
  - Example: cholesterol
5. Wax : 1 long fatty acid chain + alcohol
6. Saturated vs. Unsaturated fats
  - saturated solid (animal) and unsaturated liquid (plant)
  - single bonds (bad) vs. double bonds (good)

#### D. Nucleic Acid – methylene blue

- a. DNA – Deoxyribonucleic Acid (genetic information)
  - b. RNA – Ribonucleic Acid (carries out gene info to cell)
- nucleotides (nitrogenous base, sugar, phosphate) are basic unit that make up DNA
- A, T, G, C and discovered by Watson & Crick