Chapter 5: *The Molecules of Life*

- **5.1:** ____________ is the main ingredient of organic molecules
- **5.2:** ____________ provide fuel and building material
- **5.3:** *Lipids* include ________ and ________
- **5.4:** ____________ perform most functions in cells
- **5.5:** ____________ are proteins that speed up specific reactions in cells

### 5.1: Carbon is the main ingredient of organic molecules

- **“____________ Molecules”** are any *carbon* based molecules
- **“____________ Molecules”** are any *non-carbon* based molecules
  - Ex: H₂O and ammonia (NH₃)

**Carbon compounds come in many forms**

- Carbon bonds to ____________ atoms
- Carbon bonds to ____________ atoms
  - Called ____________
- Carbon bonds to “*functional groups*”
  - such as hydroxyls, carbonyls, carboxyls, amino groups (see pg. 93, Fig 5.2)

### Monomers make up polymers

- **Monomers** are ________________
- **Polymers** are ________________
- Some polymers are
  - *straight chains*
  - *branching chains*
  - *ring* (chains that fold back on themselves)

### Polymers are “built” and “broken”

- Adding monomers to a chain releases a water molecule (5.4)
  - “____________ reaction” *(de=remove, hydro=water)*
- Breaking down polymers requires the addition of a water molecule (5.5)
  - “____________ reaction” *(hydro=water, lysis=break down)*
Section 5.2: Carbohydrates provide fuel and building material

A _________________ is
- an organic molecule
- made up of sugar molecules
  - C, H, O
  - Sugars end in “_____”

Carbohydrates are _______________
- Therefore smaller molecules readily dissolve in water
- Some larger molecules do not dissolve in water

- Monosaccharides
  - _________________ sugar unit
  - Eg: Glucose is main energy source for cells
- Disaccharides: two _________________
  - Ex: Sucrose (glucose + fructose)
- Polysaccharides: long chains of many sugars
  - 3 main types….

Polysaccharides found in plants
- “complex carbohydrates”
  - _________________ (building” material for protection
  - People cannot digest cellulose! (FIBER)
  - _________________ (broken down into ____________)
    - Rice, potatoes, corn (plants!!)

Animal cells have a polysaccharide called
- _________________
  - Made up of many glucose monomers
  - Energy stored in the liver and muscles
Section 5.3: Lipids include fats and steroids

- ____________________ are hydrophobic substances
- There are 2 main types: ____________ and ______________
- Functions:
  - Create barriers that protect cells, store energy, chemical signals

Fats

- Consist of a 3-C backbone - “glycerol”
- “fatty acids” which contain long hydrocarbon chains
- Some are solid at room temp (butter) while others are liquid at room temp (oil)
- Store energy for later, cushions organs, insulates body

Saturated vs. Unsaturated Fats

- **Saturated**: all 3 FA’s have single bonded C’s
  - _________ the H possible
  - Animal fats (solid at room temp)
  - Seen as “unhealthy”
- **Unsaturated**: FA’s have some double bonded C’s
  - ________ all the H possible
  - Fruit, veggie and fish fats (liquid at room temp)
  - Seen as “more healthy”

Steroids

- Consists of 4 fused carbon rings
- __________________
- Act as chemical signals
  - Estrogen, testosterone
- __________________
  - Essential, found in membranes, produces other steroids

5.4 Proteins perform most functions in cells

- Important for functioning of cells
- Make up hair, fur, muscles
- Store nutrients long term
- Defend body
- Act as chemical signals
- Control chemical reactions
Proteins are made up of amino acids

- __________ consist of:
  - central C bonded to an H
  - an “Amino” group
  - “carboxyl” group
  - side group
  - Amino acids differ in their _______________
  - Side groups determine _______________

Amino Acids link together to build proteins

- Amino acids linked together are called ______________
  - Link together by dehydration reaction
- **Polypeptide chains** make up ______________
  - __________ diff amino acids...
  - ...many varieties of sequences
  - ...many different kinds of proteins!

Proteins can “Denature”

- If environment changes, proteins can change shape and “______________”

**5.5 Enzymes are proteins that speed up reactions**

- Act as “catalysts” to ________________ chemical reactions
- Lowers the “activation energy” needed for the reaction

Key parts in an enzyme catalyzed reaction

- __________
  - the specific reactant the enzyme works on
- __________
  - substrate binds to the enzyme

Example: “sucrase” is the enzyme that splits sucrose into glucose and fructose
- “-________” is an enzyme