I. Organic Compounds

A. Molecules are organic if:
1. They contain carbon AND another element
2. EXCEPTIONS: CO₂, CO₃⁻ and CO are not considered to be organic

B. Mini-quiz: Identify the following as organic or inorganic:
1. CH₄
2. CO₂
3. HNO₃
4. C₂₂H₄₄O₂
5. C₆H₁₂O₆
6. Ca(CO₃)₂
7. Diamond (pure carbon)
8. Na₃PO₄

II. Macromolecules

A. Large organic molecule
B. Necessary for a cell to function
C. Made of covalently-bonded atoms
D. Macromolecules are polymers
   1. large molecules made of smaller subunits
   2. many monomers (subunits) bond together to make a polymer

E. Four Types
   1. Carbohydrates (polysaccharides)
      a. Monomer (Subunit) = monosaccharide
      b. contains: C H & O (generally 2 Hydrogen to 1 Oxygen)
      c. provides quick, short term energy
      d. Three Kinds:
         1. Monosaccharide = 1 sugar
         2. Disaccharide = 2 sugars
         3. polysaccharide = many sugars
Types of Carbohydrates

- **Examples of carbohydrates**
  - **Cellulose**
    - found in plant cell walls, is made of carbohydrates
  - **Glycogen**
    - a carbohydrate that is stored in the liver
  - **Foods** like sugar, fruit, vegetables and bread are high in carbohydrate

**Monosaccharides**

- are simple sugars (end in ose)

- **Examples:**
  - Glucose, found in sports drinks
  - Fructose, found in fruit
  - Honey contains both glucose and fructose

**Polysaccharides:** many monosaccharides joined.
- Examples: Starch, Glycogen, Cellulose

2. **Lipids**

- **Monomers (subunits)** = glycerol & fatty acid
- **contains:** C, H & O (generally many **MORE** Hydrogen than oxygen)
- **Uses:** provides long term energy, keeps the body warm, is part of cell membranes

- **Nonpolar (doesn't dissolve in water)**

- **Examples:** phospholipids, fats, oil
  - Saturated (butter) = no double bonds = solid
  - Unsaturated (margarine) = some double bonds
  - Polyunsaturated (oil) = lots of double bonds = liquid
Types of fats

“Good”..............................................................................................................“Bad”

Omega-3 fatty acids              mono- and poly-unsaturated fatty acids

The new line showing levels of trans fat

3. Proteins
   a. Monomer (subunits) = amino acid
   b. Amino acids are joined by peptide bonds to form proteins
   c. contains: C H O & N
   d. There are 20 different types of amino acids.
      i. amino group has nitrogen
      ii. Carboxyl group has carbon
      iii. "R group" determines the type of amino acid

![Amino acid structure diagram]

   e. Food examples: meat, eggs, cheese, soy
   f. Most body structures are made of proteins
      - Ex. hair, skin, bones, cells, hormones
   g. Examples of functions:
      i. Fight infection
      ii. Enzymes speeds up chemical reactions
      iii. Structural - builds body structure

Enzymes: A type of protein

- Speed up chemical reactions by breaking molecules apart or putting them together.
- Help our body complete all the reactions we need in order to survive
- Are reusable
- Without enzymes we would DIE!
4. Nucleic acids store and transmit genetic information
   a. Monomer (subunit) = nucleotide
   b. Contains: C, H, O, N & P
   c. Three parts:
      1. Phosphate
      2. 5-carbon sugar
      3. Nitrogen base
         Adenine, Thymine, Guanine and Cytosine

III. ATP
   A. ATP = Adenosine Triphosphate
   B. Energy carrying molecule
   C. The “fuel” for the cells
      1. ATP supplies energy to carry out chemical reactions
      2. Necessary to maintain life

2. Energy is released when the phosphate (P) bond is broken
   a. When one phosphate is removed, energy is released
      \[ \text{ATP} \rightarrow \text{ADP} + P + \text{Energy} \]
   b. Energy can be captured by ADP
      \[ \text{ADP} + P + \text{Energy} \rightarrow \text{ATP} \]

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D. Energy is stored in the phosphate bond
   1. Energy comes from the breakdown of carbohydrates, lipids and proteins

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Nucleic Acids: DNA & RNA

Phosphate Group
5 Carbon Sugar (D) or Ribose
Nitrogen Group
A, T, C, or G