# Macromolecules

- Macromolecules are organic molecules
  - Carbon as a building block, also a lot of hydrogen
  - Synthesized and broken down within organisms
  - Made up of covalent bonds
- Synthesizing macromolecules requires energy input. Breaking macromolecules down releases energy
  - Therefore, energy can be stored in covalent bonds
- Macromolecules are made up of repeated units
  - Monomers: the unit
  - Polymer: a chain of units linked together
  - The shape of the macromolecule determines its function
- Four main types of macromolecules include:
  - Carbohydrates
    - Made up of monosaccharides (glucose and fructose) and polysaccharides (starch, glycogen, cellulose)
    - Mostly used to store energy; glucose is an important energy source
      - In animals: glycogen
      - In plants: starch --> structure in plants: cellulose
    - Glucose is either used for activity, stored as glycogen, or converted to fat
    - Fiber is a carb that cannot be broken down by the human digestive system , and is actually cellulose from plants that aids in digestion
      - Cellulose can't be digested because they have a different shape
  - Lipids
    - Insoluble in water
    - Three important kinds
      - Triglycerides
        - Fat molecules
        - Composed of a glycerol head and 3 fatty acid tails
        - Important source of energy storage in covalent bonds
        - Saturated fats
          - Fatty acid tails are straight due to single bonds
          - Hydrogenated
          - Usually solid at room temperature (butter)
          - Has maximum number of hydrogens
        - Unsaturated fats
          - Fatty acid tails are kinked due to double bonds
          - Prevents molecules from being stacked
          - Does not have maximum number of hydrogens
          - Usually liquid at room temperature (oil)
      - Phospholipids
        - A phosphate group with two fatty acid tails
          - Polar, hydrophilic head and nonpolar, hydrophobic tail
        - Forms cell membranes: the phospholipid bilayer