Chemistry of Life
Matter
anything that has mass and takes up space

All matter is made of atoms

Atoms → electrons, protons, and neutrons

Elements → pure substances made of only 1 type of atom

Molecules → pure substances made of 2 or more types of atoms
Chemical Bonding

**Covalent Bonds**
Molecules are groups of atoms linked by covalent bonds.

**Hydrogen Bonds**
Hydrogen bonding occurs between polar molecules.
Ionic Bonds

An ion is a charged atom or molecule. Ions of opposite charge may form an ionic bond.
Properties of Water

Storage of Heat
Water stores heat efficiently

Cohesion and Adhesion
Water binds to itself and other substances.
Polarity

Water dissolves polar molecules and ionic compounds.
Acids and Bases

**Acids** increase the hydrogen ion concentration of a solution. **Bases** decrease the hydrogen ion concentration of a solution.

**pH scale** measures the strength of acids and bases.
Carbon Compounds

**Carbohydrates**
- source of energy
- structural materials

**Lipids**
- nonpolar molecules
- store energy
- part of cell membranes.
**Proteins**

chains of amino acids.  
sequence of amino acids determines a protein’s shape and function

**Nucleic Acids**

store and transmit hereditary information.

**ATP**

main energy currency of cells.

\[ \text{ATP} \rightarrow \text{ADP} \quad \text{and} \quad \text{ADP} \rightarrow \text{ATP} \]
Energy for Life Processes

Chemical reactions absorb or release energy.

Starting a chemical reaction requires activation energy
Enzymes

Enzymes and Activation Energy
Enzymes speed up chemical reactions by decreasing the activation energy of the reactions.

Enzyme Specificity
Enzymes bind only certain substrates.

Factors in Enzyme Activity
- temperature
- pH