

Eukaryotic cells have a **nucleus** and other **membrane-bound** organelles (mitochondria, chloroplast, ER, Golgi, lysosome).

Prokaryotic cells do **NOT** have a nucleus or any other membrane-bound organelles. (The only organelles they have are ribosomes.)

All cells have: **cell membrane, cytoplasm, ribosomes, and genetic material** (chromosome(s)).

cell → tissue → organ → organ system → organism

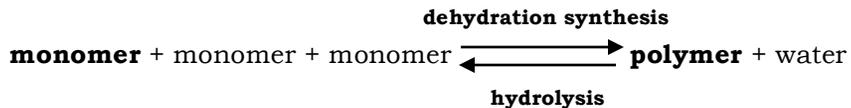
All living things share the following **characteristics**:

growth, development, homeostasis, response to stimuli, made of cells, movement (sometimes only internally), obtain and use energy, reproduction, store hereditary material in DNA)

Water is a **polar** molecule. Water's polarity causes water molecules to form **hydrogen bonds** with other water molecules. Water's unique characteristics are a result of its polarity (Ex. **high specific heat, strong cohesion and adhesion, capillary action, strong surface tension, universal solvent**)

Carbon is the backbone of important biological molecules because:

- It can form 4 covalent bonds.
- It can form large, complex, diverse molecules.



4 groups of **organic macromolecules**:

proteins: chains of **amino acids**; function as **enzymes**, hormones, membrane proteins

carbohydrates: chains of **monosaccharides**; sugars and starch; function in structure and short-term energy storage

nucleic acids: chains of **nucleotides**; DNA and RNA; store genetic information

lipids: variety of structures; all insoluble in water; function in efficient storage of **energy**, insulation, **phospholipids** compose cell membranes

All cells use **ATP** as an **energy** source for all cell processes.

Photosynthesis: occurs in chloroplasts

water + carbon dioxide + sunlight ----→ glucose + oxygen

light energy -----→ chemical energy

Cellular respiration: occurs in the mitochondria

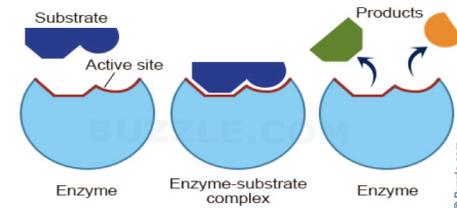
Glucose + oxygen ----→ ATP + water + carbon dioxide

chemical energy ----→ chemical energy

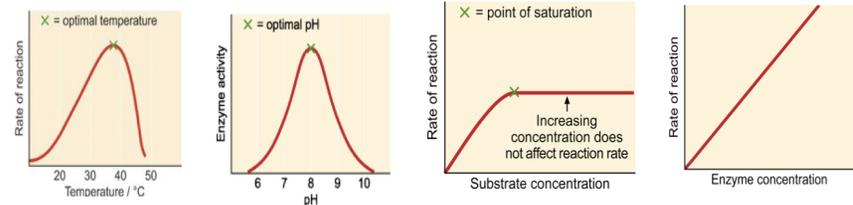
**The reactants in photosynthesis are the products in respiration and the products in photosynthesis are the reactants in respiration.

Enzymes:

- are **proteins** that speed up (**catalyze**) chemical reactions
- lower the **activation energy** needed for a reaction to occur
- are **not changed** or used up during a chemical reaction



Factors that affect enzyme activity:



Denaturation: at extreme pH's or high temperatures, the shape of an enzyme may change so much that it is no longer functional.



The cell (plasma) membrane is a **phospholipid bilayer** that **regulates what enters and leaves** the cell.

Materials enter/leave cell by the following processes:

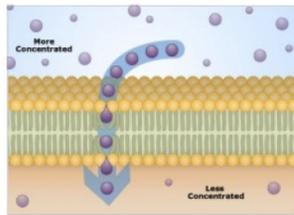
passive processes
no energy from cell needed
particles move **down conc.**

- **Diffusion**- movement through phospholipid part of membrane
- **Osmosis** – diffusion of water
- **Facilitated diffusion** – diffusion through a membrane protein

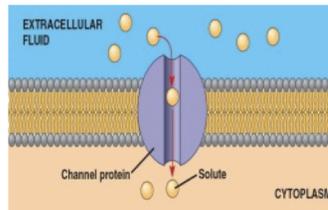
active processes
use cell's **energy**

- **Active transport** – particles are pumped against the concentration gradient
- **Endocytosis** – when a cell takes in material by creating a pocket in its cell membrane
- **Exocytosis** – when materials exit a cell after a vesicle fuses with the cell membrane

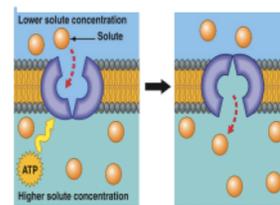
(simple) **diffusion**



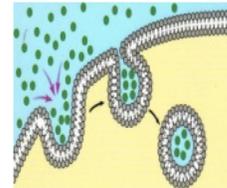
facilitated diffusion



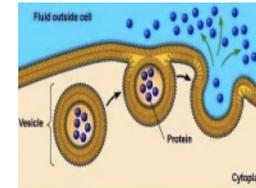
active transport



endocytosis



exocytosis



Protein Production:

vesicle
vesicle
ribosome ---→ **rough ER** ---→ **Golgi apparatus** ---→ final destination

Homeostasis: maintaining constant internal conditions (homeostatic mechanisms include sweating, shivering, breathing harder)