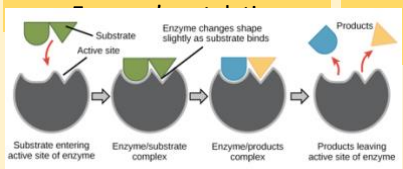
Enzymes (proteins):
- Purpose: Lower the required activation energy to speed up metabolic reactions
- Enzymes are *not* consumes during reaction

Substrates:
- SPECIFIC Reactant which binds to enzymes
- Enzyme-substrate complex: temporary association

Active Site



Competitive Inhibition:
- Inhibitor competes with active site
- Substrate can't bond

Noncompetitive inhibition:
- Inhibitor bonds with an allosteric

Enzyme–Substrate Concentration:
- Enzymes increase, reaction rate increase
- More enzyme = frequently collide with substrate
- Substrate increase

Natural Affects:
pH:
- Adds or removes H+
- Disrupts bonds and shape
- Affects 2' and 3' structure
- Denatures protein

Temperature:
- As temp increases, reaction rate increases (greater molecule Collison)

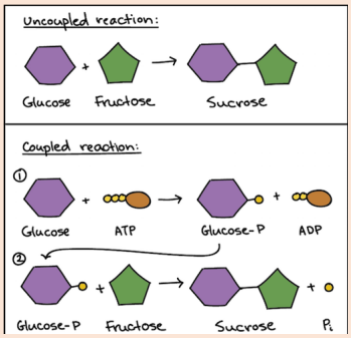
Types of Reactions
- Exergonic = release energy
- Endergonic = absorb

Induced Fit
- Lock and key
- 3-D structure fits

Laws of Thermodynamics

1. Energy of the universe is constant
2. Every process increases entropy of the

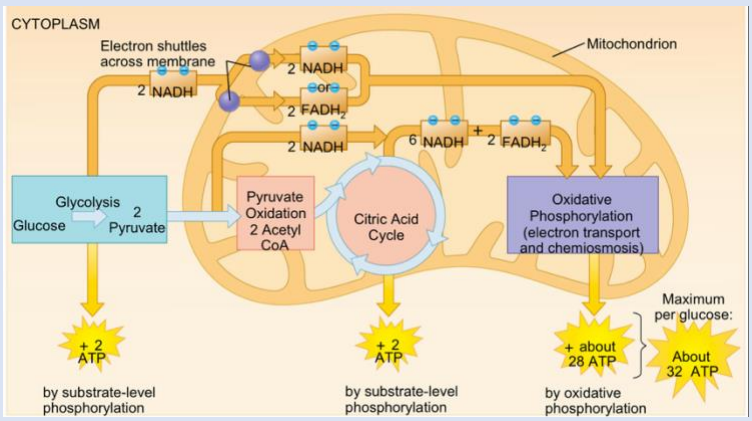
Other Rules
- Life does not violate laws of thermodynamics
- Energy input must exceed energy loss
- Cellular processes that release energy may be coupled with cellular process that require



CELLULAR RESPIRATION

Purpose:
Release energy from the chemical bonds in food

Steps:
1) Glycolysis
2) Intermediate Step
3) Citric Acid/Krebs Cycle
4) Oxidative Phosphorylation



Glycolysis
Location: Cytoplasm
Reactants: 2ADP+2Pi ; 2NAD+
Products: 2 Pyruvate; 2ATP ; 2 NADH; 2H2O
Electrons: shuttling e- and

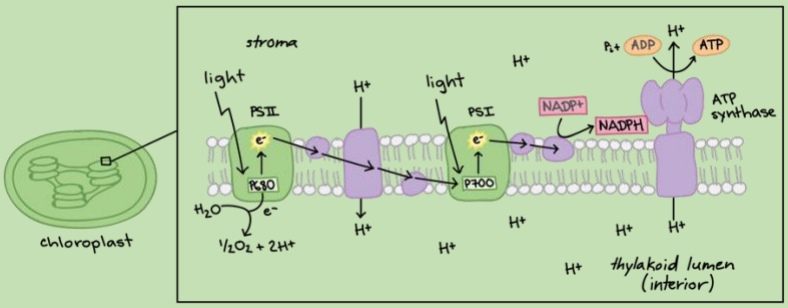
Krebs Cycle:
Location: Mitochondrial matrix
Reactants: ADP+Pi ; NAD+; FAD; Acetyl CoA
Products: ATP; NADH;

Electron Transport Chain:
Location: Inner membrane of mitochondria
Reactants: : ADP+ P; O2; NADH; FADH2
Products: NAD+H; FAD+H; ATP; H2O
Transfer of Energy:
NADH/FADH2 → Proton

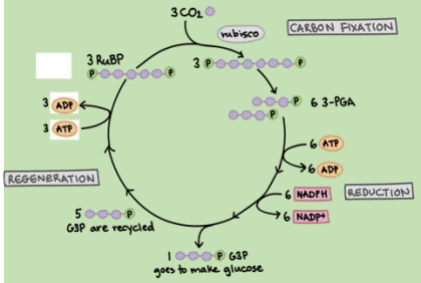
Fermentation:
- Anaerobic Process (no O2)
- Produces a small amount of ATP
- Regenerates NAD+/NADH
- Lactic Acid → human

Photosynthesis

Purpose:
Transformation of solar light energy trapped by chloroplasts into chemical bond energy stored in sugar and other molecules
1. Synthesizes energy rich molecules
2. Uses CO2 as carbon source



Light Dependent Reactions:
Location: Thylakoid
Reactants: H2O, NADP+, ADP+ Pi
Products: O2, NADPH, ATP
Purpose: Splitting of Water



Calvin Cycle:
Location: Stomata
Reactants: CO2, NADPH, ATP
Products: C6H12O6, NADP+, ADP+Pi, G3P
Purpose: Production of Sugar

Steps of Calvin Cycle:
1. Carbon Fixation
   a. Ribulose Biphosphate (RuBP)
   b. Rubisco: most abundant protein
2. Reduction
   a. Adding H+ and e- from NADPH to CO2 to make sugar
3. Regeneration
   a. G3P → RuBP