# Lecture 1

If pH < pKa, protonated.

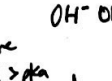
41W

Mendell's room — low pH $H^+ H^+$ — You are here. pH < pKa protonated because + $H^+$

Jovan's room — high pH $OH^- OH^-$ — You are here. pH > pKa deprotonated Jovan's ort-eater $H^+$! Ahhh!

polar: if charge dif > 0.4 ⇒ polar

Types of interactions (from strong to weak)

1. Covalent
   e.g. 
2. electrostatic 
   between charged atoms
3. Hydrogen bond
   between H & partial ⊖ atoms
4. Van der Waals
   close distance hydrophobic interaction

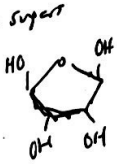
Unfavorable:
Repulsion: like charges repel
burying a charge in hydrophobic environment

# Lecture 2

biomolecules

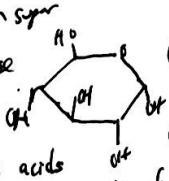
- Carbohydrates → C, H, O

5-carbon sugars

Ribose: 

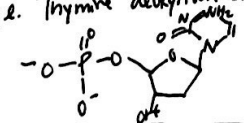
deoxyribose 

6 carbon sugar

Glucose 

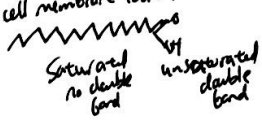
Can form polysaccharides (many ex. & Oligosaccharides (few mono ex.

- Nucleic acids

Biopolymers made of nucleotides, genetic material
1 nitrogenous base, 1 sugar, 1-3 phosphates
i.e. Thymine deoxyribonucleotide 

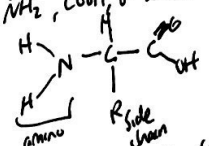
RNA & DNA formed by phosphodiester bonds (phosphate of one nucleotide & sugar of next)

- Lipids - insoluble in water
  - phospholipids, steroids, vitamins

From cell membrane looks like 

Saturated: no double bond; unsaturated: double bond

- Amino acids
  - building blocks of proteins
  - has $NH_2$, COOH, & side chain



amino; R side chain

- make peptide bonds: (OH on C, H on N, release water)

## Lecture 3

**Protein Structure**

- primary: sequence of amino acids — Covalent
- secondary: α-helix, β-sheet, loops — H-bonds
- tertiary: fold of protein in 3D space (one polypeptide chain) — vander waal, H-bonds, electro attract
- Quaternary: Number of polypeptide chains //

## Lecture 4

Enzyme binds to substrate at active site. Substrate → product

can be reversed

substrate concentration increases rate first, then plateaus


Reversible, reach equilibrium

$A + B \rightleftharpoons C$

at equilibrium

rate of reverse = rate of forward

$\Delta G = -RT \ln(K)$

when $\Delta G < 0$, $K > 1$

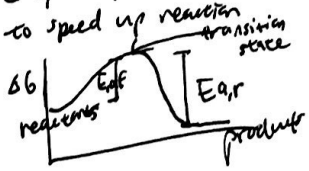
→ if $Q < K$ $\Delta G < 0$ exergonic

→ if $Q > K$ $\Delta G > 0$ endergonic

- Rate limiting steps — some reactions can be very slow
- pathways can have branch points
- can have feedback inhibition: product inhibits reaction/enzyme

Enzymes: lower activation energy ($E_a$)

to speed up reaction



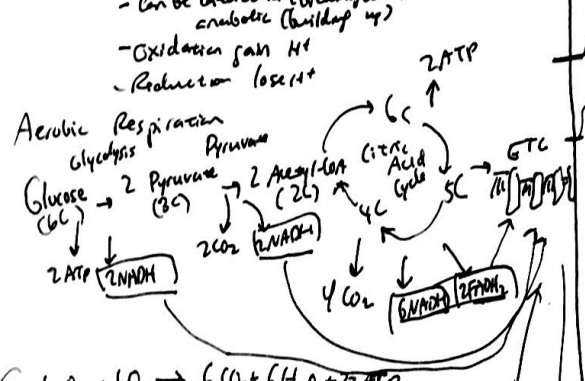

## Lecture 5

Cellular metabolism:

- fuel → energy
- can be catabolic (breaking down) anabolic (building up)
- Oxidation gain H+
- Reduction lose H+

Aerobic Respiration

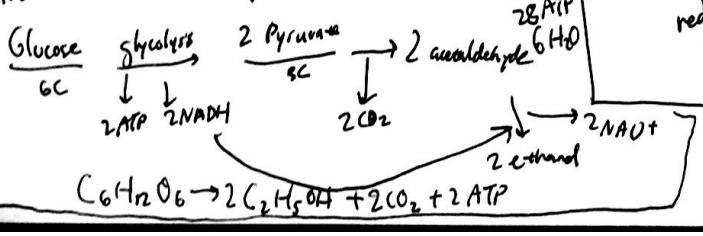
Glycolysis




$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + 32ATP$

$6O_2$

Fermentation (anaerobic respiration)




$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + 2ATP$