Terminology

원어	번역
Matter	물질
Elements	원소
Compounds	화합물
Electron	전자
Proton	양성자
Neutron	중성자
Necleus	핵
Mass number	질량 수
Atomic mass	원자 질량
Isotopes	동위원소
Radioactive isotopes	방사성 동위원소
Reactant	반응 물질
Product	산물
Solution	용액
Solvent	용매
Solute	용질
Aqueous solution	수용액

Matter

Four main elements make up about 96% of body

- Oxygen
- Carbon
- Hydrogen
- Nitrogen

remaing…

- calcium, phosphorus, … etc.

In biological chemical, electron is important!

Mass number? Atomic mass?

- Mass number = Number of protons and neutrons
- Atomic mass = AVRG(Mass number)

Isotopes

- Same number of protons and electrons. but differ in there number of neutrons.

Radioactive isotopes

- The nucleus decays spontaneously.
- Cells use it in the same way they use nonradioactive isotopes of the same element
- Radiation make it possilbe to track radioactive isotopes in cells or etc.

Chemical bonds

Ionic Bonds

- formed between oppositely charged ions

Covalent Bonds

- forms when two atoms share one or more pairs of **electron**
- strongest of the various bonds
- hold atoms together in a molecule

Hydrogen Bonds

- the electron shared between hydrogen and oxygen atoms are not shared equally.
- this cause **polar molcule**, one with uneven distribution of charge
- make it easy that ionic interaction occurs
- weak electrical attractions between neighboring water mocules
  -> hydrogen bonds
- 극성 때문에 이온이 잘 녹음
  - 녹는다는 것은 물 분자로 둘러 쌓인다는 것

Hydrophobic interaction

- ionic interaction이 불가한 물질들은 물에서 배척되어 서로 뭉친다.
  - 서로 직접적으로 인력이 작용하는 것은 아니기 때문에 약하다

Van der Waals interaction

- 비극성 물질이 순간적으로 부분적인 전하를 띌 때 발생하는 결합
  - 약한 편이지만 생물에서는 충분함

Water

1. cohesive nature of water
    - result of hydrogen bonding
    - surface tension
2. moderates temperature
    - hydrogen bonding give water strong resistance to temperature change
3. Ice floating
    - stable hydrogen bonds hold molcules apart, making ice less dense
    - Liquid water hydrogen bonds constantly break and re-form
4. Solvent of Life
    - water can dissolve various solutes necessary for life, providing a medium for chemical reaction
    - dissolve -> water mocules surround solutes

Acid

- chemical compound that releases H^+

base

- compound that accepts H^+ and removes them from solution

pH scale

- 0 to 14 (생물에게는 이 범위가 다ㅇㅇ)
  -pH = -log[H^+]

buffers

- minimize change in pH

Radioactivity as an Evolutionary Clock

- 현대 Radioactive isotopes의 비율과 과거 대기의 비율이 일치한다고 가정함. 별 수 없음 ㅇㅇ
- 짧은 기간은 C-14로 측정. 반감기가 5700년 정도