

## 2. Cell Compounds

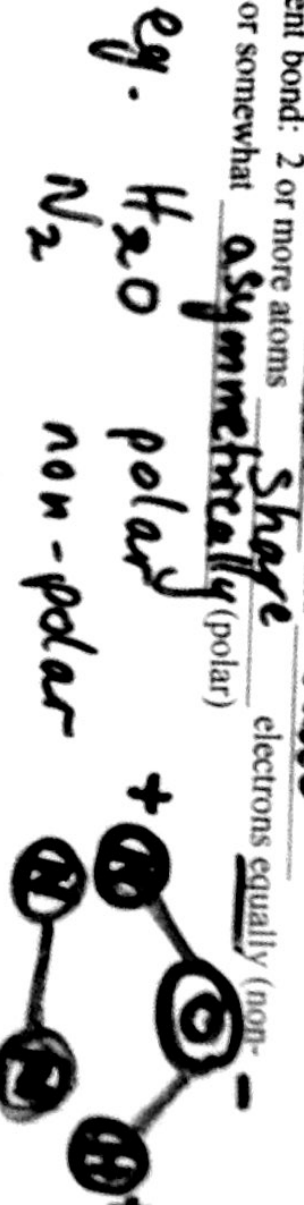
A. Bonding: The attractive force that holds atoms together.  
compound: 2 or more elements joined by chemical bonds.

① Ionic bond: oppositely charged atoms ( ions )  
are attracted to each other; one donates e<sup>-</sup> (electron) and the other accepts e<sup>-</sup>.



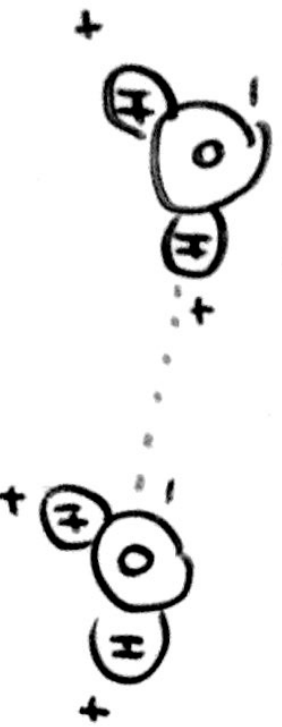
② Cation: ion - ionic bonds are relatively weak in biological systems  
anion: ion - ionic bonds readily dissolve in water

③ Covalent bond: 2 or more atoms share electrons equally (non-polar) or somewhat asymmetrically (polar)



- non-metal non-metal strong bonds  
- usually form gases or liquids at room T  
- carbon bonds covalently (organic compounds)

③ Hydrogen bond: Hydrogen atom is shared between 2 electronegative atoms



④ Hydrophobic interactions: non-polar particles that collect together in water (insoluble)

B. Water: H<sub>2</sub>O, polar, forms H-bonds, Solvent for polar molecules ( universal solvent ), regulates temperature.



- cohesion between water molecules results in Surface tension.

C. Acids and Bases: Acids dissociate in water, releasing  $H^+$  (protons)  
 (eg. HCl); bases dissociate in water, releasing  $OH^-$  (eg. NaOH)



acidic                      neutral                      alkaline

$$pH = -\log [H^+]$$

- a pH difference of 1 unit is a 10-fold difference in acidity.

D. Buffers: can accept excess protons or hydrogen ions from a solution  
 can maintain relatively constant pH (to a limit) hydroxide

- main buffers in biological systems:
  - (a) bicarbonate ( $HCO_3^-$ )  $H_2CO_3$  baking soda
  - (b) phosphates
  - (c) proteins (most important buffers)
- note: buffers do not change pH, but do help to keep it constant

E. Synthesis and Hydrolysis:

- "synthesis" means to put together
  - "hydrolysis" means split with water
  - "polymer" means a long molecule made up of repeating subunits (monomers)
1. Synthesis reaction: also called dehydration synthesis  
 - 2 molecules join by the removal of OH group from one and an H atom from the other
  2. Hydrolysis reaction: reverse of synthesis  
 - organic molecules are hydrolyzed into simpler building blocks by the addition of the equivalent of a water molecule.

Read and take notes on p. 17-28