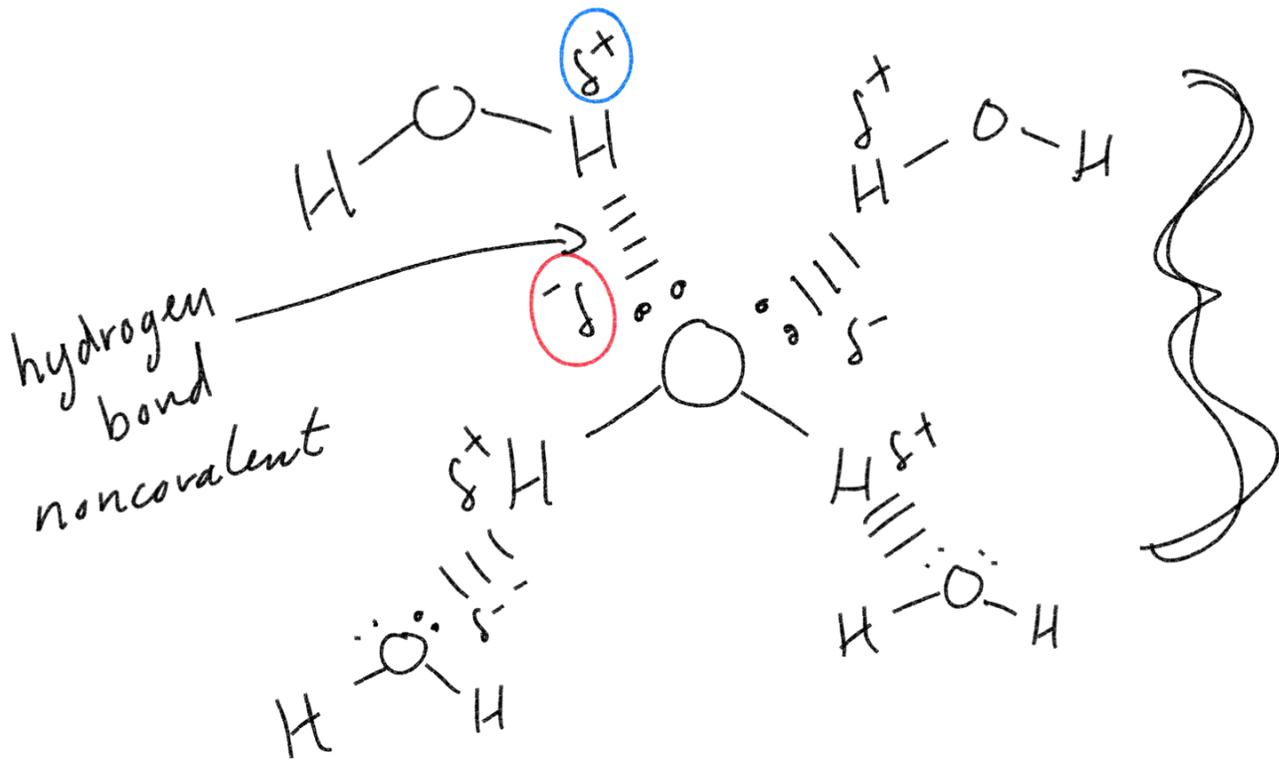
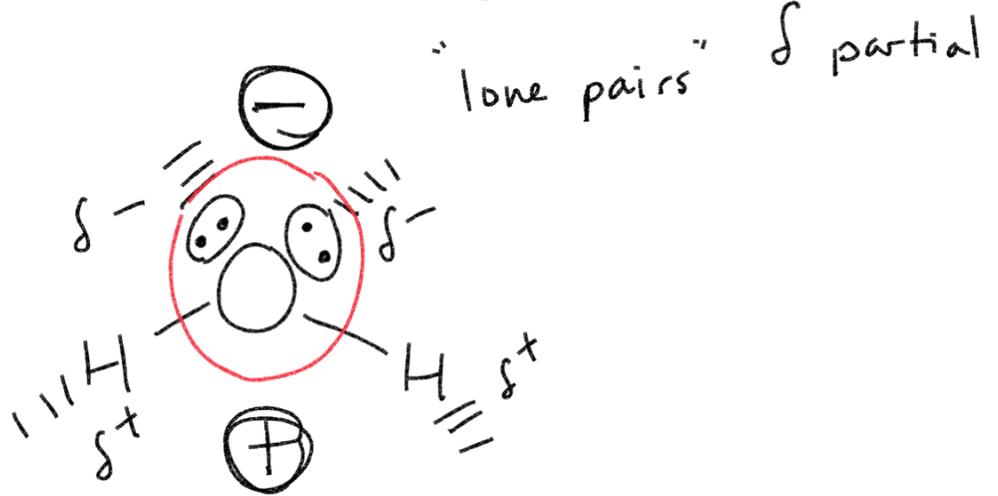
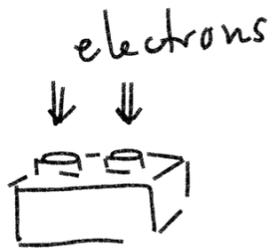
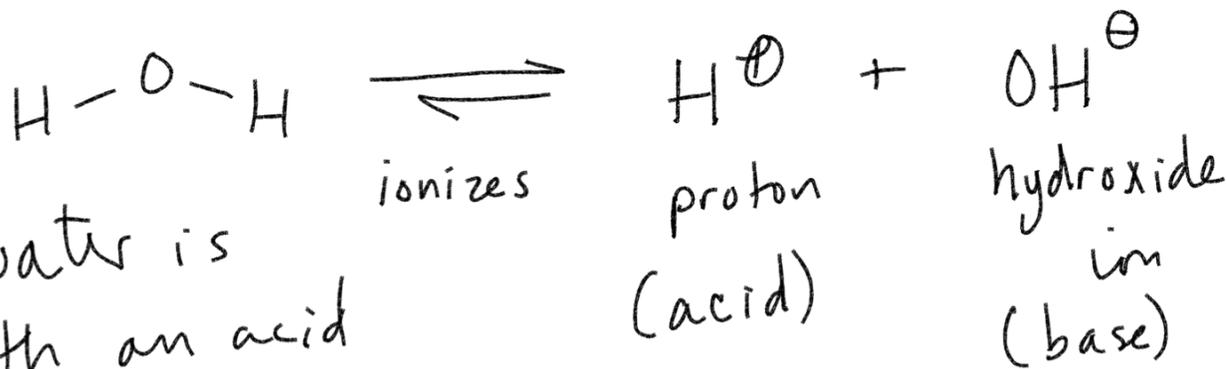
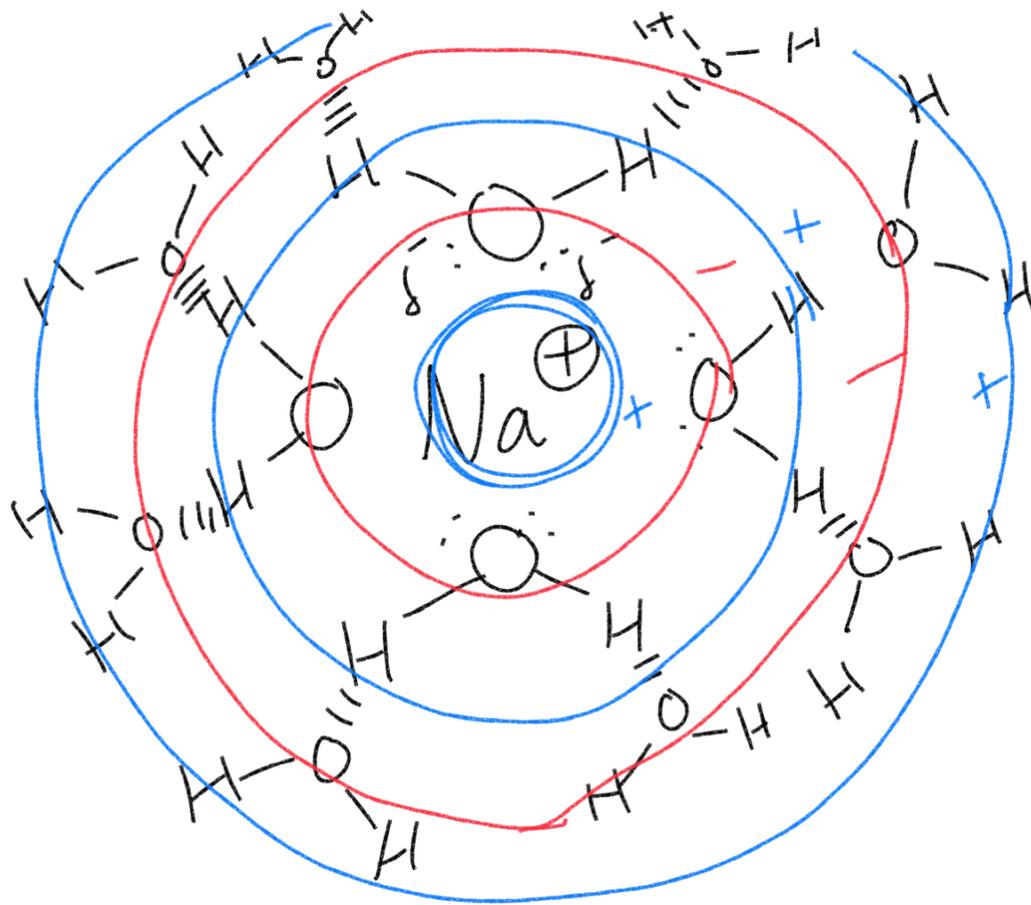


Water → Hydrogen Bonding

Δ change delta





water is both an acid and a base

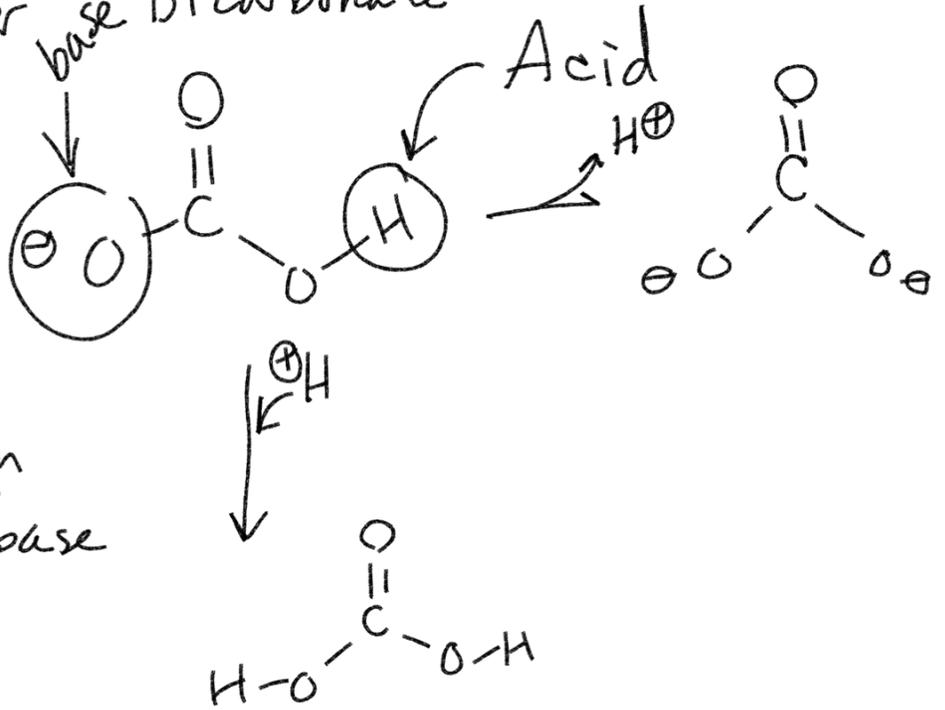
Acid → donates a proton
 Base → accepts a proton

HI HCl Acids — available H
 HBr H₂SO₄

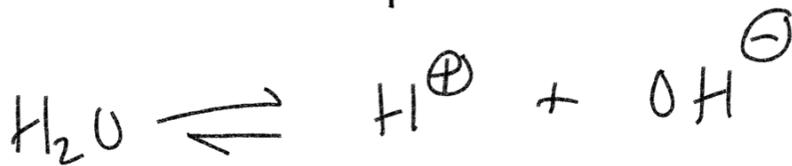
NaOH KOH Bases — accept H^+ ,
 Ba(OH)_2 often have OH^-

Blood Buffer base Bicarbonate

Buffer — resists
 change in
 pH. Can often
 act as both an
 acid and a base



Neutral pH $\text{pH} = 7$



$$\text{pH} = 7 \quad [\text{H}^{\oplus}] = 10^{-7}$$

$$[\text{OH}^{\ominus}] = 10^{-7}$$

$$10^{-7} = \frac{1}{10^7} = \frac{1}{10,000,000}$$

$$pH = 6$$

$$[H^+] = 10^{-6}$$

$$\frac{1}{10^6} = \frac{1}{1,000,000}$$

$$pH = 4$$

$$[H^+] = 10^{-4}$$

$$\frac{1}{10^4} = \frac{1}{10,000}$$

$$pH = 1$$

$$[H^+] = 10^{-1}$$

$$\frac{1}{10^1} = \frac{1}{10}$$

$$pH = 0$$

$$[H^+] = 10^0$$

$$1 = \frac{1}{1}$$

$$pH = -1$$

$$[H^+] = 10^{-(-1)} = 10^1 = 10$$

$$\frac{10}{1}$$

8 M HCl

$$pH = 4$$

$$[H^+] = 10^{-4}$$

$$-4 + (-10) = -14$$

8 M OH^-

Acidic

$$[OH^-] = 10^{-10}$$

$$[H^+] = \frac{1}{10,000}$$

$$[OH^-] = \frac{1}{1,000,000,000}$$

$$pH = 12$$

$$[H^+] = 10^{-12}$$

Basic

$$[OH^-] = 10^{-2}$$

$$pOH = 5$$

$$[OH^-] = 10^{-5}$$

$$[H^+] = 10^{-9}$$

vinegar solution
solute \rightarrow acetic acid ^{5%}
solvent \rightarrow water

