

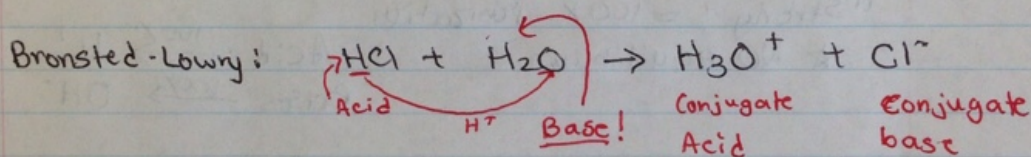
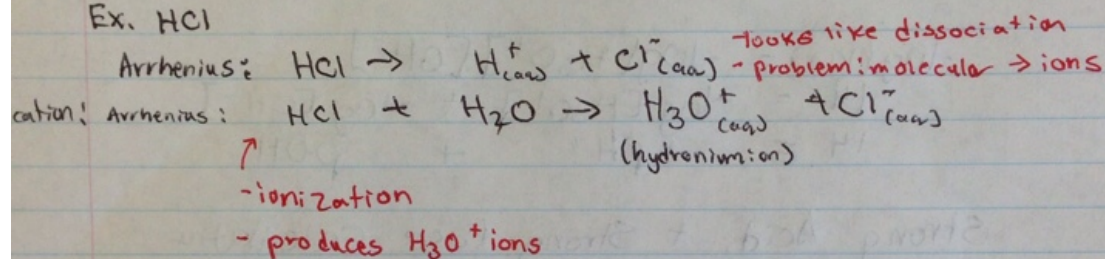
8.1 Acids + Bases Equilibrium

① Theories

↳ Arrhenius - acids produce hydrogen ions H^+
bases produce hydroxide ions OH^-

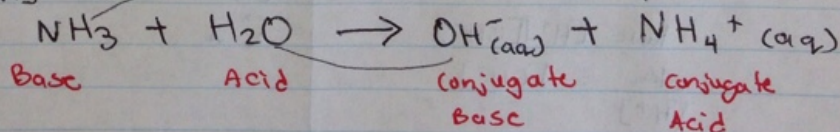
↳ Bronsted Lowry - acids are proton donors
bases are proton acceptors

Ex. HCl



HCl and Cl^- is a conjugate acid-base pair
 H_2O and H_3O^+ " " " " " "

Ex. NH_3



conjugate acid-base pairs: NH_3 and NH_4^+
 H_2O and OH^-

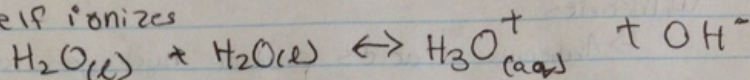
★ Substances that can act like a base or an acid are called amphoteric substances

ex. H_2O , HCO_3^- , HSO_4^- , HPO_4^{2-} , $H_2PO_4^-$

Equilibrium
is temperature
dependent

#1 pg 532. The first equilibrium of acids and bases: K_w

- water self ionizes



★ @ 25°C

$1 \times 10^{-7} \text{ mol/L}$

$1 \times 10^{-7} \text{ mol/L}$

$$\begin{aligned} K_w &= [\text{H}_3\text{O}^+][\text{OH}^-] \\ &= [1 \times 10^{-7} \text{ mol/L}]^2 \\ &= 1 \times 10^{-14} \end{aligned}$$

$[] \rightarrow \text{pH}$ do $-\log$
 $\text{pH} \rightarrow []$ do $10^{-\text{pH}}$

$$\begin{aligned} -\log(K_w) &= -\log[\text{H}_3\text{O}^+][\text{OH}^-] \\ 14 &= -\log[\text{H}_3\text{O}^+] + -\log[\text{OH}^-] \\ 14 &= \text{"pH"} + \text{pOH} \end{aligned}$$

Strong Acid. + Strong Base Calculation

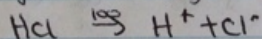
"Strong" = 100% ionization

★ NO equilibrium

Acids $\xrightarrow{100\%} \text{H}^+$
Bases $\xrightarrow{100\%} \text{OH}^-$

Ex. Pg 535 0.15 mol/L HCl ... Calculate $[\text{OH}^-]$? Ex. #19 pg 549

Step 1 - you know it's strong acid



0.15 mol/L

$$K_w = [\text{H}^+][\text{OH}^-]$$

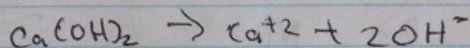
$$\frac{K_w}{[\text{H}^+]} = [\text{OH}^-]$$

$$[\text{OH}^-] = \frac{1.0 \times 10^{-14}}{0.15}$$

$$= 6.7 \times 10^{-14} \text{ mol/L}$$

$\text{Ca}(\text{OH})_2$ mass \div Molar mass

Find moles / L. $v = 100 \text{ mL}$



[]

$2 \times [\text{Ca}^{2+}]$

$\times [\text{OH}^-]$

$14 = \text{pH} + \text{pOH}$

$14 - \text{pOH} = \text{pH}$

Questions: pg 537 # 4, 5

540 # 10

546 # 13, 14

549 # 18