

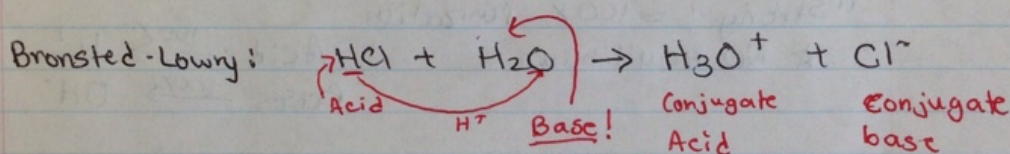
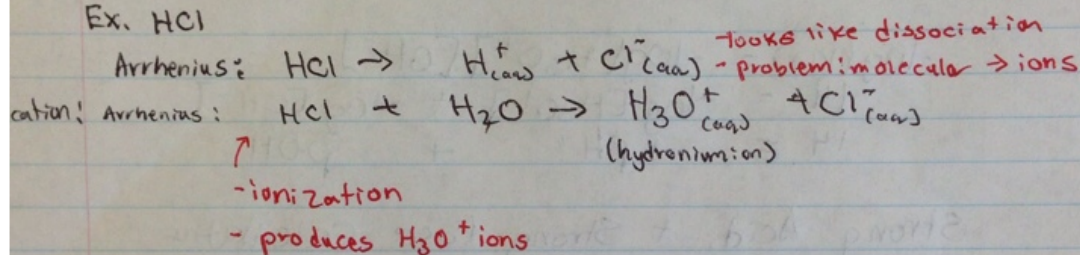
## 8.1 Acids + Bases Equilibrium

### ① Theories

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

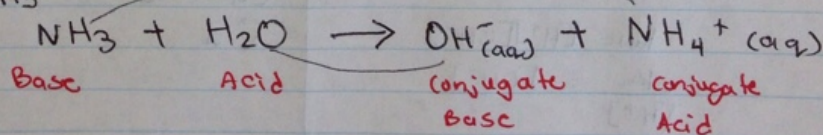
↳ Bronsted Lowry - acids are proton donors  
bases are proton acceptors

Ex. HCl



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

Ex.  $NH_3$



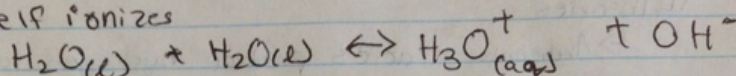
conjugate acid-base pairs:  $NH_3$  and  $NH_4^+$   
 $H_2O$  and  $OH^-$

★ 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<sup>2</sup> pg 532. The first equilibrium of acids and bases:  $K_w$

- Water self ionizes



\* @ 25°C

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

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$$K_w = [H_3O^+][OH^-]$$

$$= [1 \times 10^{-7} \text{ mol/L}]^2$$

$$= 1 \times 10^{-14}$$

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

$$-\log(K_w) = -\log[H_3O^+][OH^-]$$

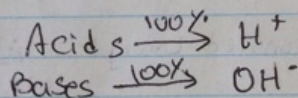
$$14 = -\log[H_3O^+] + -\log[OH^-]$$

$$14 = "pH" + pOH$$

Strong Acid. + Strong Base Calculation

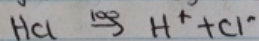
"Strong" = 100% ionization

\* NO equilibrium



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

Step 1 - you know it's strong acid



0.15 mol/L

$$K_w = [H^+][OH^-]$$

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

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

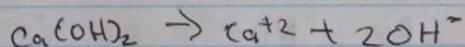
$$= 6.7 \times 10^{-14} \text{ mol/L}$$

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$Ca(OH)_2$  mass ÷ Molar mass

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



$[ ]$

$$2 \times [Ca^{2+}] = 2 \times [OH^-]$$

$pOH$

$$14 = pH + pOH$$

$$14 - pOH = pH$$

Questions: pg 537 # 4, 5

540 # 10

546 # 13, 14

549 # 18