

① Strong (US) Weak

dissociate ~ 100% Acids Bases > < 5% dissociates  
 $K_a + K_b \ll 10^{-14}$

100% Soluble ← Salts → insoluble or  
slightly soluble  
dissolves very little.

Mole RATIO  
No RICE Table needed

$Na \ x \ Ac \rightarrow Na^+ + a \ Ac^-$   
1M  $\xrightarrow{100\%}$  1M

$K_{sp}$   
 $K \rightarrow$  amt dissolved/dissoc.  
at eq at  $\rightleftharpoons$  equilibrium.

Mar 11-7:24 AM

② Neutralization / Titration

① Acid  $\leftrightarrow$  Base.  
 $A + B \rightarrow$  Salt + water.

① Neutralize using MOLES! (RICE - sub smaller)  
② 'E' Recalc new Molarity  $\frac{\text{moles}}{\text{Total Volume}}$   
③ Find pH.....

If no  $H^+$  or  $OH^-$  (ex. " $F^-$ ") and  $H_2O$  then eq.  
 $F^- + H_2O \rightarrow HF + OH^-$

Mar 11-7:42 AM

② Next / Titration

④ Buffer! p 727

↳ conjugate "Salt of the acid"

Acid  $\text{HOAc} \rightarrow \text{NaOAc}$  conjugate

⑨ Add SA or SB to a buffer. differ by 1 H<sup>+</sup>

Conj base  $\text{OAc}^-$

Same steps as in ⑨

Mar 11-7:46 AM

7/11/5 11/6	$K_a$ - Acids	BL def <sup>n</sup>	lose H <sup>+</sup>
	$K_b$ - Bases	BL def <sup>n</sup>	gain H <sup>+</sup>

$K_a \times K_b = K_w$  ALWAYS

$\text{pH} = -\log \text{H}^+$   
 $\text{pOH} = -\log \text{OH}^-$   
 $[\text{H}^+][\text{OH}^-] = 1 \times 10^{-14}$   
 $\text{pH} + \text{pOH} = 14$

$K_w = 1 \times 10^{-14}$  at 25°C

$\text{pH} = \text{p}K_a + \log \frac{[\text{base}]}{[\text{acid}]}$   
 (-log K<sub>a</sub>)

$K = \frac{[\text{Prod}]^{\text{coeff}}}{[\text{React}]^{\text{coeff}} * [\text{R}]^{\text{coeff}}}$

$Q > K$  →  $\text{AT EQ}$  (US) Q NOT at EQ

$Q < K$  →  $\text{AT EQ}$

Mar 11-7:50 AM



$\text{LaF}_3$  + 0.2M NaF  
 $K_{sp} = 2 \times 10^{-19}$  SOLUBLE!  
 $[\text{F}^-] = 0.2\text{M} = [\text{Na}^+]$

$\text{LaF}_3(\text{s}) \rightarrow \text{La}^{+3} + 3\text{F}^-$   
 M RATIO:  $x$                        $x$                        $3x + 0.2$

$K_{sp} = [\text{La}^{+3}][\text{F}^-]^3 = 2 \times 10^{-19}$   
 $(x)(0.2)^3 = 2 \times 10^{-19}$   
 $x = 2.5 \times 10^{-17}$                        $(\text{La}^{+3})$

Mar 11-8:17 AM

PS17-1  
 ①  $\text{HOAc} \rightleftharpoons \text{H}^+ + \text{OAc}^-$   
 Want Eqn to go ←  
 Add  $\text{H}^+$  and/or  $\text{OAc}^-$

② HCN WA + KCN sol. salt ③  

	HCN	$\rightarrow$	$\text{H}^+$	+	$\text{CN}^-$
I	0.1				
D	-x		+x		+x
F	0.1-x		x		0.1+x

$K = \frac{x(0.1+x)}{0.1-x}$

Mar 11-8:23 AM

(4) 50ml 1M  $K_2A_2$  Salt of WA

50ml 1M  $H_2A$  (WA)

$$\boxed{pH = pK_a} + \log \frac{b}{a}$$

$$= -\log(1.8 \times 10^{-5}) + \log \frac{1}{1}$$

Q

Mar 11-8:33 AM

(5) 0.75 mole  $NH_3$  Base

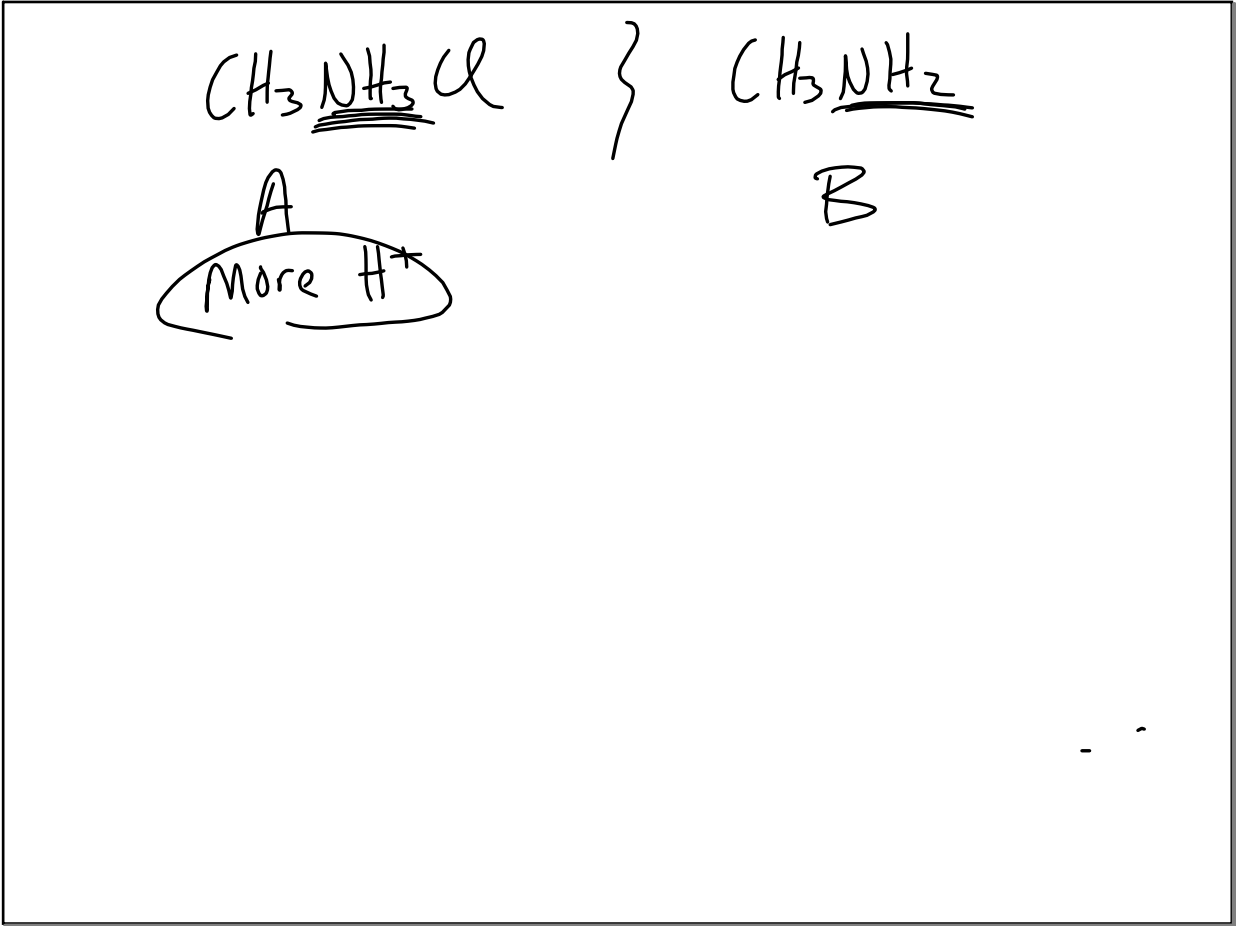
0.25 mole  $NH_4Cl$  Acid (More  $H^+$ )

$$pH = pK_a + \log \frac{b}{a}$$

$$pH = -\log(5.56 \times 10^{-10}) + \log \frac{0.75}{0.25}$$

$$K_a \times K_b = K_w$$

Mar 11-8:35 AM



Mar 11-8:40 AM

(17)  $\text{KOH} + \text{HCl} \rightarrow \text{KCl} + \text{H}_2\text{O}$

	$8.235 \times 10^{-3}$	$9.425 \times 10^{-3}$		
Initial				
Change	$-8.235 \times 10^{-3}$	$-8.235 \times 10^{-3}$		
Equilibrium	$\alpha$	$1.19 \times 10^{-3}$		

(18) Recalc M

$0.110 \text{ L} = 0.0108 \text{ M } [\text{H}^+]$

$\text{pH} = -\log(\quad)$

$\text{pH} = 1.97$

Mar 11-8:43 AM