

WA + Salt of WA.

$HA + H_2O(l) \rightleftharpoons H_3O^+ + A^-$   
 $HA(aq) \rightleftharpoons H^+(aq) + A^-(aq)$

NaA  
 Buff -  
 $H + A^-$

ACID → More  $H^+$  in soln  
 Stronger The acid

Add in common ion ( $A^-$ ) ←  
 Removing  $H^+$  from soln.

Mar 2-7:39 AM

$HA \rightleftharpoons H^+ + A^-$   
 ACID                      CONJ. BASE

$\Rightarrow K_a = \frac{[H^+][A^-]}{[HA]}$

Solve for  $(H^+) \Rightarrow [H^+] = \frac{K_a[HA]}{[A^-]}$

$-\log[H^+] = -\log\left(\frac{K_a[HA]}{[A^-]}\right)$

$-\log[H^+] = -\log K_a + -\log\left(\frac{[HA]}{[A^-]}\right)$

HH Eqn:  $pH = pK_a + \log\left(\frac{[A^-]}{[HA]}\right)$

Log Rule:  
 $-\log\left(\frac{A}{B}\right)$   
 $+ \log\left(\frac{B}{A}\right)$

$\log AB = \log A + \log B$

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$$pH = pK_a + \log \frac{[A^-]}{[HA]} \quad \begin{array}{l} \text{base} \\ \text{acid.} \end{array}$$

If  $[Base] = [Acid]$  then  $\frac{A^-}{HA} = 1$

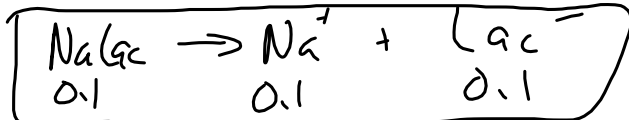
$$pH = pK_a + \log 1$$

$$pH = pK_a$$

Mar 2-8:06 AM

0.12 M HLAC  
 $K_a = 1.4 \times 10^{-4}$

+ 0.1 M NaLac



Buffer

WA

+

Salt of WA

OR

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

$$pH = -\log(1.4 \times 10^{-4}) + \log \frac{0.1}{0.12}$$

$$pH = 3.77$$

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OR

$$Hlac \rightarrow H^+ + Lac^-$$

I	0.12	x	x + 0.1
Δ	-x	+x	+x
E	0.12-x	x	0.1+x

$$\frac{x(0.1+x)}{0.12-x} = 1.4 \times 10^{-4}$$

$$x = 1.68 \times 10^{-4} = (H^+)$$

$$pH = -\log(1.68 \times 10^{-4}) = 3.77$$

Mar 2-8:23 AM

Titration / Neutralization

Base (a) Add base to an existing acid pH < 7

↓  
Cause pH ↑ to "7"  
neutralization

(b) Add an acid to an existing base

(1) BASE → (2) Add Acid ↓ pH

(if pH < 7) Neutralization.

Mar 2-8:36 AM

Have 10ml 3M HCl. How many ml 0.5M NaOH are needed to neutralize.

**Neutral**  $\Rightarrow$   $n_A \cdot M_A \cdot l_A = n_B \cdot M_B \cdot l_B$

*Moles = M \* l*

$(1) (3) (10) = 1 (0.5) \text{ ml}$

**60ml NaOH**

Mar 2-8:40 AM

3ml 10ml 3M HCl Add 1ml 0.5M NaOH

PH: -0.477 PH=?

**USE MOLES**

$\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{HOH}$

$\text{H}^+ + \text{Cl}^- + \text{Na}^+ + \text{OH}^- \rightarrow \text{Na}^+ + \text{Cl}^- + \text{HOH}$

$\text{H}^+ + \text{OH}^- \rightleftharpoons \text{HOH}$

I	$3 \times 10^{-2}$	$5 \times 10^{-4}$	$\emptyset$
D	$-5 \times 10^{-4}$	$-5 \times 10^{-4}$	$+5 \times 10^{-4}$
E	$2.95 \times 10^{-2}$	$\emptyset$	$5 \times 10^{-4}$

Subst. smaller amount

$M = \frac{\text{moles}}{l} = \frac{2.95 \times 10^{-2}}{1 \times 10^{-3}} = 2.95 \times 10^1 \text{ M}$

$\text{PH} = -\log[\text{H}^+] = -0.428$

10ml acid + 1ml base

2.68M H+

Mar 2-8:46 AM



17 / #28  
PS 17 / 1-14  
Skip 9, 10, 11

Mar 2-9:16 AM