

(17.27) Schematic on p. 727 (12) $K_a = 1.8 \times 10^{-5}$

0.1 M H_2Ac + 0.13 M NaOAc

Have? WA (RICE) Salt of the WA common ion

$\text{NaOAc} \rightarrow \text{Na}^+ + \text{OAc}^-$
 0.13M 0.13M 0.13M

100% soluble salt

Pre 9) pH H_2Ac

	H_2Ac	\rightarrow	H^+	+	OAc^-
I	0.1		0		0
A	-x		+x		+x
E	0.1-x		x		x

$\frac{x^2}{0.1-x} = \frac{1.8 \times 10^{-5}}{1}$

$x = 0.00134 = [\text{H}^+]$

$\text{pH} = -\log([\text{H}^+]) = 2.87$

Mar 7-7:24 AM

9) $\text{H}_2\text{Ac} \rightleftharpoons \text{H}^+ + \text{OAc}^-$ (Buffer common ion)

I	0.1		0	+	0.13
A	-x		+x		+x
E	0.1-x		x		0.13+x

$\frac{x(0.13+x)}{0.1-x} = \frac{1.8 \times 10^{-5}}{1}$

$x = 1.34 \times 10^{-5}$

$\text{pH} = 4.86$

$\text{pH} = \text{p}K_a + \log \frac{b}{a}$

$= -\log(1.8 \times 10^{-5}) + \log \frac{0.13}{0.1}$

$= 4.86$

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$\text{H}_2\text{Ac} + \text{KOH} \rightarrow \text{K}^+ \text{OAc}^- + \text{HOH}$

I	0.1	0.02	0.13
D	-0.02	-0.02	+0.02
E	0.08		0.15

0.08M H_2Ac (WA)
 0.15M OAc^- (SA)

$\text{pH} = \text{pK}_a + \log \frac{1}{9}$
 $\text{pH} = -\log(1.8 \times 10^{-5}) + \log \frac{0.15}{0.08}$
 $\text{pH} = 5.02$

① Next using Moles
 Subst. smaller # A/B
 ② Recalc new M
 ③ Find pH

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$\text{H}_2\text{Ac} \xrightarrow{\text{Buffer}} \text{H}_2\text{Ac} + \text{NaOAc} \xrightarrow{\text{SA}} \text{H}_2\text{Ac} + \text{NaOAc} \xrightarrow{\text{SB}} \text{H}_2\text{Ac} + \text{NaOAc} \xrightarrow{\text{HNO}_3} \text{HNO}_3 + \text{NaOAc}$

pH 2.87 \rightarrow 4.86 \rightarrow 5.02 \rightarrow 4.71

Add 0.02 mole HNO_3

$\text{HNO}_3 + \text{NaOAc} \rightarrow \text{NaNO}_3 + \text{HOAc}$

I	H^+ 0.02	OAc^- 0.13	HOAc 0.1
D	-0.02	-0.02	+0.02
E		0.11M OAc^-	0.12 mole HOAc

0.11M OAc^- 0.12M HOAc

$\text{pH} = -\log(1.8 \times 10^{-5}) + \log \frac{0.11}{0.12}$
 $\text{pH} = 4.71$

① Next with Moles Subst smaller #
 ② Recalc. new M
 ③ Find pH

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Titration

Add x ml Acid to x ml base.

Equivalence Point Equivalent amounts H^+ + OH^-
 $pH \sim 7$

End point \rightarrow Indicator changes color.

Phenolphthalein 8 \rightarrow 10
 colorless \rightarrow Pink.

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Equivalent Point $pH \sim 7$ ~~Moles H^+~~

Moles Acid H^+ = Moles base OH^-

$\underbrace{N_A}_{\# \text{ moles } H^+} * M_A * l_A = \underbrace{N_B}_{\# \text{ mole } OH^-} * M_B * l_B$

$HCl = 1$
 $H_2SO_4 = 2$
 $H_3PO_4 = 3$

$NaOH = 1$
 $Ca(OH)_2 = 2$

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49 ml 0.1 M NaOH + 50 ml 0.1 M HCl (PH = ?)

~~NaOH~~ + ~~HCl~~ → ~~NaCl~~ + HOH

OH ⁻	+	H ⁺	→	HOH
I 0.0049		0.0050		X
A -0.0049		0.0049		X
E 0		0.0001		X

1 × 10⁻⁴ moles

Total volume → 0.099 l = 1.01 × 10⁻³ M [H⁺] (2) Recalc M

PH = 3

(1) Next using Moles!
Subst.

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50 ml 0.1 M NaOH + 49.9 ml 0.1 M HCl

H ⁺	+	OH ⁻	→	HOH
I 0.00499		0.00500		X
A -0.00499		-0.00499		X
E 0		1 × 10 ⁻⁵		X

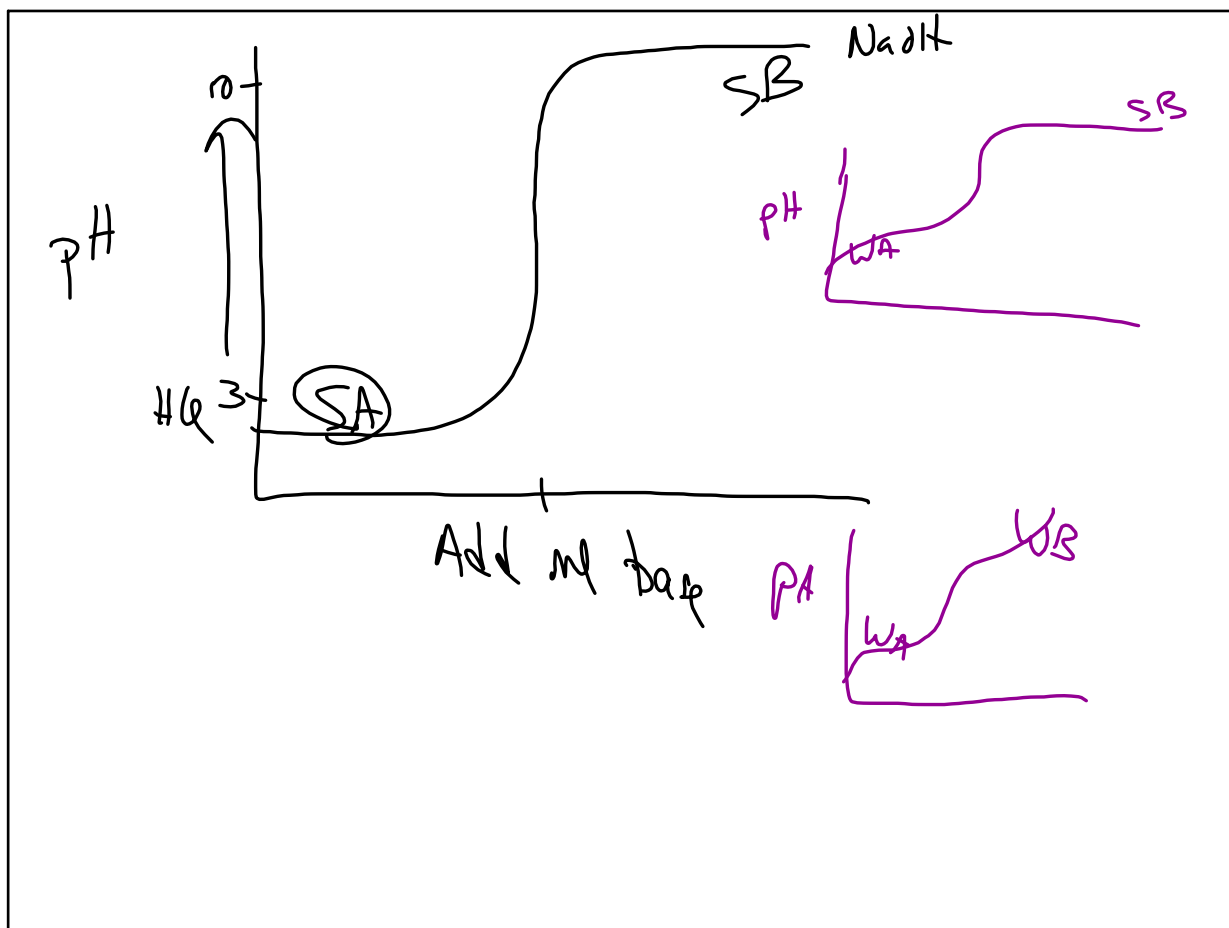
1 × 10⁻⁵ moles OH⁻

$\frac{1 \times 10^{-5}}{0.0999} = 1.01 \times 10^{-4} \text{ M OH}^-$ (2) Recalc M

PH = 10

(3) PH

Mar 7-8:38 AM



Mar 7-8:42 AM

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Mar 7-8:46 AM