

(20) $[OH^-]$ large. \Rightarrow Large pH, Low pOH, Low $[H^+]$

(a) pH = 3 \rightarrow pOH = 11 $\quad [OH^-] = 1 \times 10^{-11}$

(b) $1 \times 10^{-4} M HNO_3 \rightarrow [H^+] = 1 \times 10^{-4}$, $[OH^-] = 1 \times 10^{-10}$

(c) pOH = 12 $\quad [OH^-] = 1 \times 10^{-12}$

(d) Water (pH = 7) pOH = 7 $\quad [OH^-] = 1 \times 10^{-7}$

(e) $1 \times 10^{-9} M HCl$, $H^+ = 1 \times 10^{-9}$ $\quad [OH^-] = 1 \times 10^{-5}$

(JA)

Feb 28-8:07 AM

(24) (a) $KNO_3 \rightarrow KOH_{SB} + HNO_3_{SA}$ (N)

(b) $Ca(NO_3)_2 \rightarrow Ca(OH)_2_{SA} + HNO_3_{SA}$ (N)

(c) $NH_4NO_3 \rightarrow NH_4OH_{WB} + HNO_3_{SA}$ (A)

(d) $KCl \rightarrow KOH_{SB} + HCl_{SA}$ (W)

(e) $BaBr_2 \rightarrow Ba(OH)_2_{SB} + HBr_{SA}$ (N)

Feb 28-8:41 AM

(14) $0.025M$ HA $(H^+) = ?$

$HA \rightleftharpoons H^+ + A^-$

I	0.025	0	0
Δ	$-x$	$+x$	$+x$
E	$0.025-x$	x	x

$$K_a = \frac{(x)(x)}{0.025-x} = 1.4 \times 10^{-3}$$

Feb 28-8:44 AM

Chap 16 [ions] H^+/OH^- in soln.

Chap 17 → multiple ions + mixtures in soln.

Feb 28-9:01 AM

0.3M H_2Ac $\text{pH} = ?$ $K_a = 1.8 \times 10^{-5}$

I	H_2Ac	\rightleftharpoons	H^+	+	Ac^-
II	0.3		x		x
D	$-x$		$+x$		$+x$
E	$0.3-x$		x		x

$K_a = \frac{x^2}{0.3} = 1.8 \times 10^{-5}$

$x = 2.32 \times 10^{-3} = [\text{H}^+]$

$\text{pH} = 2.63$

Feb 28-9:02 AM

Buffer \Rightarrow Addition and prevents marked (LARGE) changes in pH.

\Rightarrow A + B in one salt.

(ex) Sodium Acetate $\Rightarrow \text{Na}^+ \text{Ac}^-$

Prevent
Large Changes
in pH

absorb extra H^+ ions and neutralize "extra"

Absorb extra OH^- and neutralize "OH"

NaOH
SB

H_2Ac
WA

Feb 28-9:09 AM

0.3M H_2Ac add 0.1 mole NaOAc in 1L soln.

0.3 M H_2Ac A + 0.1 M NaOAc B

WA common ion

$\text{H}_2\text{Ac} \rightleftharpoons \text{H}^+ + \text{OAc}^-$

I	0.3	0	0
D	-x	+x	+x
E	0.3-x	x	0.1+x

$K_a = \frac{x(0.1+x)}{0.3-x} = \frac{1.8 \times 10^{-5}}{1}$

$x = 5.4 \times 10^{-5} = [\text{H}^+]$

pH = 4.27

100% soluble
 $\text{NaOAc} \rightarrow \text{Na}^+ + \text{OAc}^-$
 $0.1\text{M} \rightarrow 0.1 + 0.1$

Common Ion

Feb 28-9:14 AM

$\text{pH} = \text{p}K_a + \log \frac{[\text{base}]}{[\text{acid}]}$

-log[H⁺] -log(K_a) → pK_a

WA + Salt of WA

H₂Ac + NaOAc

Henderson-Hasselbach eqn

$\text{pH} = -\log(1.8 \times 10^{-5}) + \log \frac{0.1}{0.3}$

$= 4.74 + -0.477$

$= 4.26$

Feb 28-9:26 AM

$$17 / 16 + 21$$

Feb 28-9:30 AM