

(1) $\text{HZ} \rightarrow \text{H}^+ + \text{Z}^-$

I	0.02	0	0
D	-x	+x	+x
E	0.02-x	x	x

$\text{pH} = 4.93$
 $\text{pH} = -\log(\text{H}^+)$
 $-4.93 = \log(\text{H}^+)$
 $[\text{H}^+] = 1.18 \times 10^{-5}$
 "x"

(6) $K_a = \frac{[\text{H}^+][\text{Z}^-]}{[\text{HZ}]} = \frac{(1.18 \times 10^{-5})^2}{0.02 - 1.18 \times 10^{-5}} = 6.9 \times 10^{-9}$

Mar 19-8:05 AM

(2) $\text{B}^- + \text{HOH} \rightleftharpoons \text{HB} + \text{OH}^-$
 $\text{CH}_3\text{NH}_2 + \text{H}_2\text{O} \rightleftharpoons \text{CH}_3\text{NH}_3^+ + \text{OH}^-$

I	0.35	0	0
D	-x	+x	+x
E	0.35-x	x	x

$K_b = \frac{(x)(x)}{0.35-x} = 4.4 \times 10^{-4}$

$x = 0.0124 \text{ M } (\text{OH}^-)$ $\text{pOH} = 1.91$ $\text{pH} = 12.09$

Mar 19-8:25 AM

(23) NH_4OH NH_4Cl HCl SA $K_b = 1.8 \times 10^{-5}$
 $K_a \times K_b = K_w$

I	0.35	0	0
D	$-x$	$+x$	$+x$
E	$0.35 - x$	x	x

$K_a = \frac{x^2}{0.35 - x} = 5.56 \times 10^{-11}$

Mar 19-8:30 AM

(24) $\text{pH} = 7$ KCl + $\text{H}_2\text{O} \Rightarrow$
 B \swarrow \searrow A
 KOH HCl
 SB SA

Mar 19-8:35 AM

SALT pH Find pH of 0.2M NaF

Molecular Eqn

$$\text{NaF} + \text{H}_2\text{O} \rightleftharpoons \text{NaOH} + \text{HF}$$

Complete Ionic

$$\cancel{\text{Na}^+} + \text{F}^- + \text{H}_2\text{O} \rightleftharpoons \cancel{\text{Na}^+} + \text{OH}^- + \text{HF}$$
SA/SB/soluble salts (125) →

Net Ionic Eqn

$$\text{F}^- + \text{H}_2\text{O} \rightleftharpoons \text{OH}^- + \text{HF}$$

$\text{NaF} \rightarrow \text{Na}^+ + \text{F}^-$ 100% soluble
 0.2M 0.2 0.2

*NaOH (SB) HF (WA)
 Ans. pH > 7
 BASIC SALT!*

Mar 19-8:39 AM

pH=?

$$\text{F}^- + \text{H}_2\text{O} \rightleftharpoons \text{HF} + \text{OH}^-$$
 $K_a = 6.8 \times 10^{-7}$

I	0.2		0	0
D	-x		+x	+x
E	0.2-x		x	x

$$K_b = \frac{(x)(x)}{0.2} = 1.47 \times 10^{-11}$$

$$x = 1.71 \times 10^{-6} = [\text{OH}^-]$$

$\text{pOH} = 5.77$ $\text{pH} = 8.23$

*pH 11.6 K_b
 pH 1.5 K_a CA.
 $K_a \times K_b = K_w = 10^{-14}$
 $6.8 \times 10^{-7} \times K_b = 10^{-14}$*

Mar 19-8:52 AM

Find pH 0.1M NaCN pH > 7

NaCN + H₂O ⇌ ^{WA}HCN + ^{SB}NaOH

~~Na⁺~~ + CN⁻ + H₂O ⇌ ^{K_a = 4.9 × 10⁻¹⁰}HCN + ~~Na⁺~~ + OH⁻

I	CN ⁻	+ H ₂ O	⇌	HCN	+ OH ⁻
O	0.1			0	0
	-x			+x	+x
F	0.1-x			x	x

$K_b = \frac{x^2}{0.1-x} = \frac{2 \times 10^{-5}}{1}$ $x = 1.4 \times 10^{-3} = [OH^-]$

pOH = 2.85

pH = 11.15 ✓

Mar 19-8:59 AM

Chap 17

Common ion effect. LeChatlier's principle

HA ⇌ H⁺ + A⁻

HA ⇌ H⁺ + A⁻

← reach eq

If I add more H⁺ then what will happen?

← HA ⇌ H⁺ + A⁻

Mar 19-9:17 AM

Find pH of a soln 0.3M H_2Ac + 0.1M NaOAc
 WA Salt Basic salt.

$\text{H}_2\text{Ac} \rightleftharpoons \text{H}^+ + \text{OAc}^-$
 common ion [initial]

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

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

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

$\text{NaOAc} \rightarrow \text{Na}^+ + \text{OAc}^-$
 0.1M 0.1 0.1
 Soluble salt
 Breaks up 100%

$\text{pH} = -\log([\text{H}^+])$
 $\text{pH} = 4.27$

Mar 19-9:20 AM

0.085M HNO_2 + 0.1M KNO_2
 WA

$\text{HNO}_2 \rightleftharpoons \text{H}^+ + \text{NO}_2^-$

I	0.085	0	0
D	-x	+x	+x
E	0.085-x	x	0.1+x

$K_a = \frac{x(0.1+x)}{0.085-x} = 4.5 \times 10^{-4}$

K^+ 0.1M NO_2^- 0.1M

Mar 19-9:28 AM

HW

$$16/83 + 17/16a$$

Mar 19-9:30 AM