

$$\text{pH} + \text{pOH} = 14$$

$$\text{pH} = -\log(\text{H}^+) \quad \rightarrow \quad \text{pOH} = -\log(\text{OH}^-)$$

$$[\text{H}^+][\text{OH}^-] = 1 \times 10^{-14} \text{ at } 25^\circ\text{C}$$

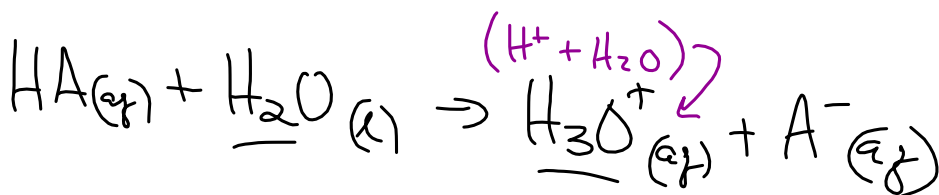
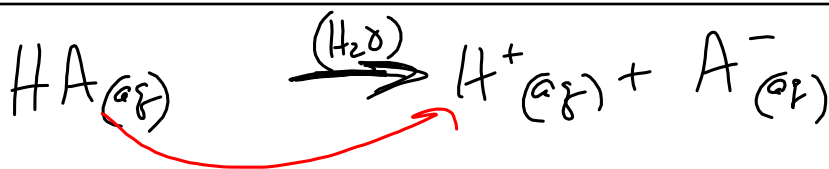
$$[\text{OH}^-] = 8.5 \times 10^{-3}$$

$$[\text{H}^+] = \frac{1 \times 10^{-14}}{8.5 \times 10^{-3}} = 1.18 \times 10^{-12}$$

$$\text{pOH} = -\log(\text{OH}^-)$$

$$= -\log(8.5 \times 10^{-3})$$

Mar 1-7:39 AM



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

(LARGE K_a)
 Acid breaks up
 A LOT into H^+ ions

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SA

$$\text{HCl} \rightarrow \text{H}^+ + \text{Cl}^-$$

I	6M	0	0
Δ	-6M	+6M	+6M
E	0	6M	6M

$$K = \frac{[\text{H}^+][\text{Cl}^-]}{[\text{HCl}]} = \frac{(6)(6)}{\sim 0}$$

lim As $[\text{HCl}] \rightarrow 0$ Then $K_a \rightarrow \infty$

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WA

$$\text{HCOOH} \rightarrow \text{H}^+ + \text{COOH}^-$$

% ionization = 0.1

I	0.1	0	0
Δ	-4.17 × 10 ⁻³	+4.17 × 10 ⁻³	+4.17 × 10 ⁻³
E	0.096	4.17 × 10 ⁻³	4.17 × 10 ⁻³

$K_a = ?$

$\text{pH} = 2.38$

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

$$2.38 = -\log[\text{H}^+]$$

$$4.17 \times 10^{-3} = [\text{H}^+]$$

$$K_a = \frac{[\text{H}^+][\text{COOH}^-]}{[\text{HCOOH}]}$$

$$K_a = 1.81 \times 10^{-4}$$

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% Ionization → how much
it "breaks up"

$$\% = \frac{\text{Part}}{\text{Whole}} \times 100$$

$$\frac{4.17 \times 10^{-3}}{0.1} = 4.17 \times 10^{-2} \times 10^2$$

$W_A = 4.17\% \text{ ionized}$

Mar 1-8:37 AM

Find pH of 0.3M Acetic Acid. $K_a = 1.8 \times 10^{-5}$

$\text{H}_2\text{C}_2\text{H}_3\text{O}_2$ Acetate ion

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

	H_2OAc	H^+	OAc^-
Initial	0.3	0	0
Change	-X	+X	+X
Equilibrium	0.3-X	X	X

$\text{pH} = -\log[\text{H}^+]$
 $= -\log 2.3 \times 10^{-3}$
 $\text{pH} = 2.638$

$\% \text{ ionized} = 0.77\%$

$K_a = \frac{[\text{H}^+][\text{OAc}^-]}{[\text{H}_2\text{OAc}]}$

$$\frac{1.8 \times 10^{-5}}{1} = \frac{(X)(X)}{0.3 - X}$$

$$X^2 + 1.8 \times 10^{-5}X - 5.4 \times 10^{-6} = 0$$

$X = 2.3 \times 10^{-3}$

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5% rule \angle 5% ionized
 or $[I]$ and K_a are
 ≥ 4 decimal places apart

IGNORE "-x"

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

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

$x = 2.3 \times 10^{-3}$

0.0023

3 sig figs

Mar 1-8:56 AM

Find $[OH^-]$ of 0.2M HCN.

$K_a = 4.9 \times 10^{-10}$

	HCN	\rightarrow	H ⁺	+	CN ⁻
I	0.2		0		0
D	-x		+x		+x
E	0.2-x		x		x

$K_a = 4.9 \times 10^{-10} = \frac{x^2}{0.2-x}$

$x = 9.9 \times 10^{-6} = [H^+]$

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

1×10^{-9}

% I = $\frac{9.9 \times 10^{-6}}{0.2}$

$\rightarrow 0.00495\%$

Mar 1-9:01 AM

$$[\] = \text{Molarity} = \frac{\text{Moles solute}}{\text{l soln}}$$

16	48 a → c, 64
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