$pH + pOH = 14$

$pH = -\log[H^+]$ $\quad$ $pOH = -\log[OH^-]$

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

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

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

$= 1.18 \times 10^{-12}$

$pOH = -\log(OH)$

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

$=$

Mar 1-7:39 AM

$HA_{(aq)} \xrightarrow{(H_2O)} H^+_{(aq)} + A^-_{(aq)}$

$HA_{(aq)} + H_2O_{(l)} \rightarrow H_3O^+_{(aq)} + A^-_{(aq)}$ $\quad (H^+ + H_2O)$

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

LARGE K_a

Acid breaks up A LOT into H^+ ions

STRONG

Mar 1-7:56 AM

SA

$HCl \rightarrow H^+ + Cl^-$

	HCl	H^+	Cl^-
I	6M	~~0~~	~~0~~
Δ	−6M	+6M	+6M
E	≈~~0~~	6M	6M

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

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

Mar 1-8:13 AM

WA

$HCOOH \rightarrow H^+_{(aq)} + COOH^-_{(aq)}$

% ionization = $\frac{\text{Part}}{\text{Whole}}$

	$HCOOH$ (aq)	H^+ (aq)	$COOH^-$ (aq)
I	0.1	~~0~~	~~0~~
Δ	-4.17×10^{-3}	$+4.17\times10^{-3}$	$+4.17\times10^{-3}$
E	0.096	4.17×10^{-3} Part	4.17×10^{-3}

K_a=?

pH=2.38

$pH = -\log[H^+]$

$2.38 = \log[H^+]$

$4.17\times10^{-3} = [H^+]$

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

$K_a = 1.81\times10^{-4}$

Mar 1-8:17 AM

% Ionization → how much it "breaks up"

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

$$\frac{4.17\times10^{-3}}{0.1} = 4.17\times10^{-2} \times 100$$

$$\%_{ion} = 4.17\%_{ionized}$$

Mar 1-8:37 AM

Find pH of 0.3M Acetic Acid.

$K_a = 1.8\times10^{-5}$

$HC_2H_3O_2$

Acetate ion

$HOAc \rightarrow H^+_{(aq)} + OAc^-_{(aq)}$

	$HOAc$	H^+	OAc^-
I	0.3	0	0
MOLE RATIO	$-x$	$+x$	$+x$
E	$0.3-x$	x	x

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

$$\frac{1.8\times10^{-5}}{1} = \frac{(x)(x)}{0.3-x}$$

$$x^2 + 1.8\times10^{-5}x - 5.4\times10^{-6}$$

$x = 2.3\times10^{-3}$

$pH = -\log[H^+]$

$= -\log 2.3\times10^{-3}$

$pH = 2.638$

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

Mar 1-8:41 AM

5% rule < 5% ionized

or [I] and K_a are ≥ 4 decimal places apart

IGNORE "− x"

HAD $\frac{x^2}{0.3-x} = 1.8\times10^{-5}$

3×10^{-1}

$\Rightarrow \frac{x^2}{0.3} = \frac{1.8\times10^{-5}}{1}$

0.0023

$x = 2.3\times10^{-3}$

Mar 1-8:56 AM

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

$K_a = 4.9\times10^{-10}$

10^{-1}

$HCN \rightarrow H^+ + CN^-$

	HCN	H^+	CN^-
I	0.2	0	0
Δ	−x	+x	+x
E	0.2−x	x	x

$K_a = \frac{4.9\times10^{-10}}{1} = \frac{x^2}{0.2-x}$

$x = 9.9\times10^{-6} = [H^+]$

pH = 5

pOH = 9

$[H^+][OH^-] = 1\times10^{-14}$

1×10^{-9}

% I $= \frac{9.9\times10^{-6}}{0.2}$

0.00495%

Mar 1-9:01 AM

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

16	48 a→c, 64

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