Calculate the pH of each of the following solutions of a strong acid in water.

a. 0.10 M HCl

$pH = -\log[.10] = 1$

b. 5.0 M HCl

$pH = -\log[5.0] = -.70$

c. 1.0×10^{-11} M HCl (H_3O^+ from water)

$pH = -\log[1.0\times10^{-11} + 1.0\times10^{-7}] = 7.0$

Feb 19-11:20 AM

A solution is prepared by mixing 90.0 mL of 5.00 M HCl and 30.0 mL of 8.00 M HNO_3. Water is then added until the final volume is 1.00 L. Calculate the $[H^+]$, $[OH^-]$, and the pH for this solution.

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

$M = \frac{moles}{L}$

$5 = \frac{x}{.090} = .45 moles$

$HNO_3 \rightarrow H^+ + NO_3^-$

$M = \frac{moles}{L}$ $8.0 = \frac{x}{.030} = .24 moles$

Total $H^+ = .45 + .24 = \frac{.69}{1L}$

$[H^+] = .69$

$[OH^-] = 1.5\times10^{-14}$

$pH = 0.16$

Feb 19-11:40 AM

What mass of HNO_3 is present in 250 mL of a nitric acid solution having a pH = 5.10.

$5.10 = -\log[H^+]$

$[H^+] = 7.9 \times 10^{-6} = [HNO_3]$

$7.9 \times 10^{-6} = \frac{x}{.250}$ $x = 2.0 \times 10^{-6}$ mol $\times \frac{63 g}{1}$

$= 1.3 \times 10^{-4}$ g

Feb 10-11:42 AM

An unknown weak acid having a concentration of 0.250 M is found to have a pH of 3.80. What is the K_a of the acid?

$HA + H_2O \rightarrow H_3O^+ + A^-$

$3.80 = -\log[H^+]$

$[H^+] = 10^{-3.80} = 1.6 \times 10^{-4}$ M

$K_a = \frac{(1.6 \times 10^{-4})(1.6 \times 10^{-4})}{.250}$

$= 1.0 \times 10^{-7}$

Feb 12-2:41 PM

An unknown weak acid having a concentration of 0.250 M is found to have a pH of 5.30. What is the K_a of the acid?

$5.30 = -\log[H^+]$ $[H^+] = 5.0\times10^{-6}$

$K_a = \frac{(5.0\times10^{-6})(5.0\times10^{-6})}{.250}$

$= 1.0\times10^{-10}$

Feb 13 3:45 PM

Calculate the pH to each of the following solutions.

look up value

a) 0.250 M HOC_6H_5

$HOC_6H_5 + H_2O \rightarrow H_3O^+ + OC_6H_5^-$

	0	0
.250		
$-x$	$+x$	$+x$
$.250-x$	x	x
$\approx .250$		

$\frac{x^2}{.250} = 1.6\times10^{-10}$

$x = [H_3O^+] = 6.3\times10^{-6}$

$pH = 5.20$

b) 0.250 M HCN

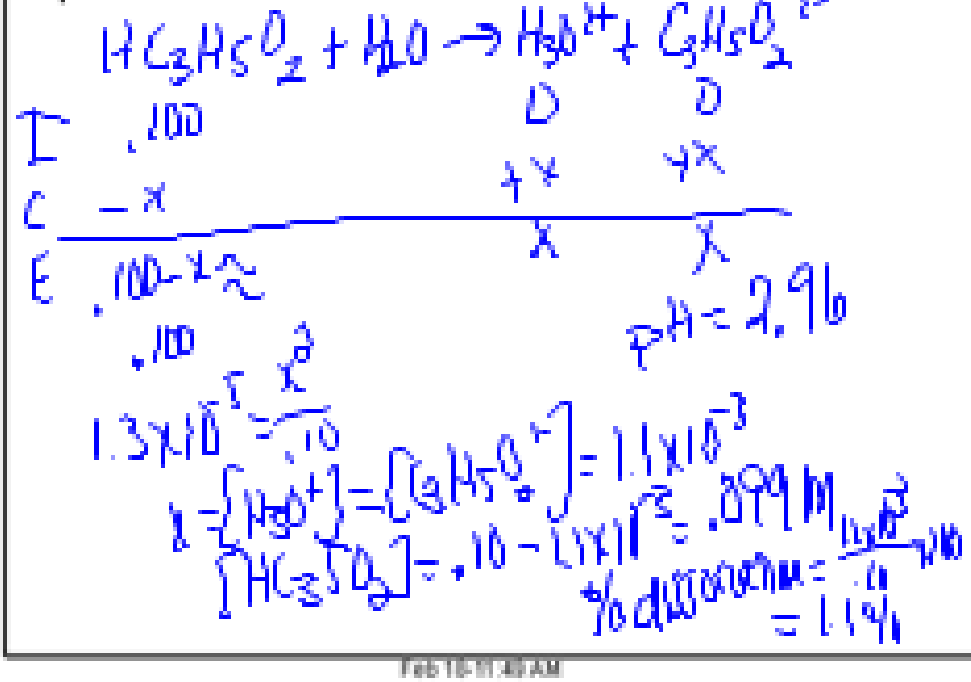
$K_a = 6.2\times10^{-10} = \frac{x^2}{.250}$

$x = [H_3O^+] = 1.2\times10^{-5}$

$pH = 4.90$

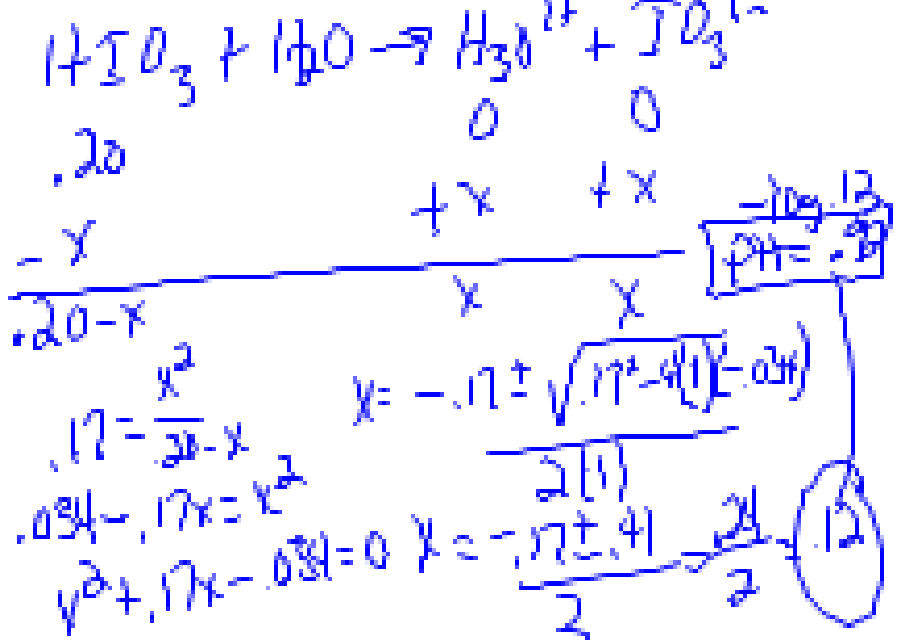
Feb 16 11:40 AM

For propanoic acid ($HC_3H_5O_2$, $K_a = 1.3 \times 10^{-5}$), determine the concentration of all species present, the pH, and the percent dissociation of a 0.100 M solution.



Feb 16 11:48 AM

Calculate the pH of a 0.20 M solution of iodic acid (HIO_3, Ka = 0.17).



Feb 16 11:51 AM

Arsenic acid (H_3AsO_4) is a triprotic acid with $K_{a1} = 5 \times 10^{-3}$, $K_{a2} = 8 \times 10^{-8}$, $K_{a3} = 6 \times 10^{-10}$. Calculate the $[H^+]$, $[OH^-]$, $[H_3AsO_4]$, $[H_2AsO_4^-]$, $[HAsO_4^{2-}]$, and $[AsO_4^{3-}]$ in a 0.20 M arsenic acid solution.

Omit

Feb 10-11:58 AM

Feb 12-2:19 PM

72. Write the reaction and the corresponding K_b equilibrium expression for each of the following substances acting as bases in water.

a. $C_6H_5NH_2$

$$K_b = \frac{[OH^-][C_6H_5NH_3^+]}{[C_6H_5NH_2]}$$

b. $(CH_3)_2NH$

$$K_b = \frac{[OH^-][(CH_3)_2NH_2^+]}{[(CH_3)_2NH]}$$

Feb 19-11:48 AM

80. Calculate the pH of a 0.050 M $(C_2H_5)_2NH_2$ solution ($K_b = 1.3 \times 10^{-3}$).

$$(C_2H_5)_2NH_2 + H_2O \rightarrow (C_2H_5)_2NH_2^+ + OH^-$$

	.050	0	0
	$-x$	$+x$	$+x$
	$.050-x$	x	x

$$1.3\times10^{-3} = \frac{x^2}{.050}$$

$$x = .0081$$

$$\frac{.0081}{.050} \times 100 = 16\%$$

must use quadratic

$$1.3\times10^{-3} = \frac{x^2}{.050-x}$$

$$6.5\times10^{-5} - 1.3\times10^{-3}x = x^2$$

$$x^2 + 1.3\times10^{-3}x - 6.5\times10^{-5} = 0$$

$$x = \frac{-1.3\times10^{-3} \pm \sqrt{(1.3\times10^{-3})^2 - 4(1)(-6.5\times10^{-5})}}{2}$$

$$x = \frac{-1.3\times10^{-3} - .016}{2}$$

$$x = .0074$$

$$[OH^-] = .013$$

$$pH = 11.87$$

Feb 19-11:51 AM