

2/21/13

Quiz: Which of following is not a correctly matched set?

Barium hydroxide  $\rightarrow$  BaOH-

2. Which of following is not correct?

If  $[H_3O^+] > [OH^-]$  then  $pH > 7$

True  $\Rightarrow K_a \times K_b = 1 \times 10^{-14}$

$$pH + pOH = 14$$

3.) The pH of solution is found to 3. What is  $[OH^-]$ ?

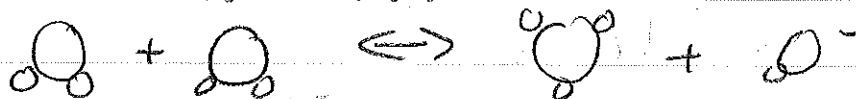
$$[H_3O^+] = 1 \times 10^{-11}$$

$$pH = 3$$

$$[H_3O^+] = 10^{-pH} = 10^{-3}$$

$$[OH^-] = \frac{K_w}{[H_3O^+]} = \frac{10^{-14}}{10^{-3}} = 1 \times 10^{-11}$$

Auto ionization of water



$$pH = -\log [H_3O^+]$$

$$pOH = -\log [OH^-]$$

$\rightarrow$  Calculate the  $K_a$  of a weak acid?

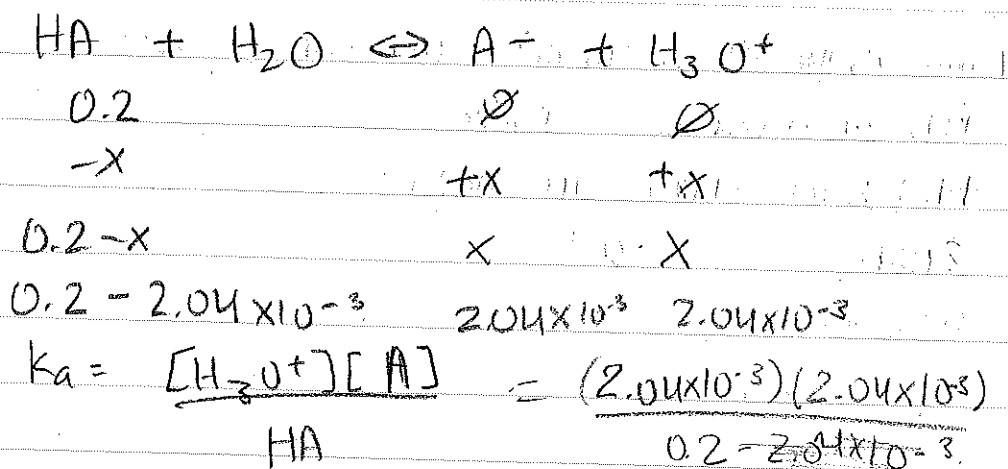
The pH of 0.2M aqueous of acetic acid is 2.69

What is  $K_a$  of acetic acid.

$$[H_3O^+] = 0.00204$$

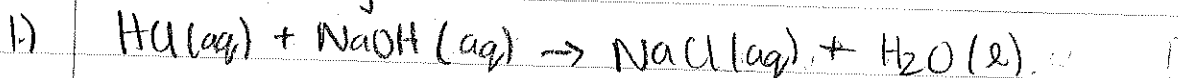
$$2.08 \times 10^{-5}$$

R  
I  
C  
E



Pol

Given following



What is pH of resulting solution if equal parts of equal concentration? Neutral

→ HCl Strong acid

NaOH → strong base

go to completion

pH of HCl → 1.9

pOH of NaOH → 10.39

What is pH of 0.1 molar HCl?  $[\text{H}_3\text{O}^+] = 0.1$

$$\text{pH} = -\log(0.1)$$

What is pH of 0.1 molar NaOH?  $[\text{OH}^-] = 0.1$

$$\text{pOH} = -\log(0.1) = 1$$

$$\text{pH} = 13$$

What is the pH of resulting solutions.

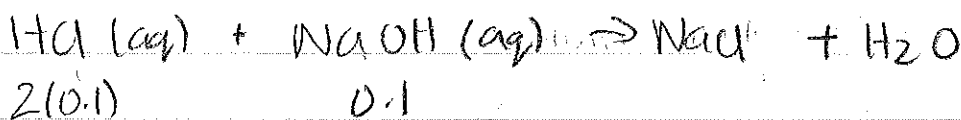


pH = 7

2. What is pH of resulting solution if 2 parts of 0.1M HCl are mixed with 1 part 0.1M NaOH?

→ Acidic

3. What is the pH of resulting solution if 2 parts of 0.1M HCl are mixed w/ 0.1M NaOH?

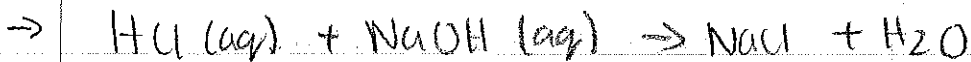


	<div style="border: 1px solid black; padding: 2px; display: inline-block;">HCl</div> 0.1M 200mL	<div style="border: 1px solid black; padding: 2px; display: inline-block;">NaOH</div> 0.1M 100mL	<div style="border: 1px solid black; padding: 2px; display: inline-block;"> <math>\text{H}^+</math> <math>\text{Na}^+</math>  <math>\text{H}_2\text{O}</math> <math>\text{Cl}^-</math> </div> 300mL
I	0.02 mol	0.01 mol	
C	-0.01	-0.01 mol	+0.01
E	0.01	<del>0</del>	0.01

$$\frac{0.01 \text{ mol}}{0.3 \text{ L}} = 0.033 \text{ M} \quad 0.033 = [\text{H}_3\text{O}^+]$$

1.5

2. What is pH of resulting solution if 1 part of 0.1M HCl are mixed w/ two parts 0.1M NaOH?



pH = 12.5

	100mL	200mL	$\frac{0.01 \text{ mol}}{0.3} = 0.033 \text{ M}$
I	0.01	0.02	
C	-0.01	-0.01	pOH = $-\log(0.033)$
E	0	0.01	pOH = 1.5

$$\text{pH} = 14 - 1.5 = 12.5$$

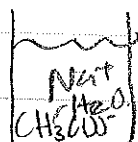
3.) What is pH of 0.1M  $\text{CH}_3\text{COOH}$  solution?

C. Acidic.

Weak acid.

• What is the pH of the resulting solution if 1 part 0.1M CH<sub>3</sub>COOH is mixed w/ 1 part 0.1M NaOH?

→ Basic solution because



CH<sub>3</sub>COO<sup>-</sup> → conjugate base of acetic acid.



Salt acts like a weak base.

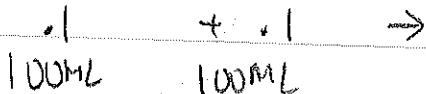
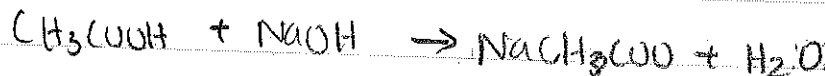
What is pH of 0.1M CH<sub>3</sub>COOH solution  $K_a = 1.8 \times 10^{-5}$

$[\text{H}_3\text{O}^+] = 1.3 \times 10^{-3}$

pH = 2.9

What is pH of resulting solution if 1 part 0.1M CH<sub>3</sub>COOH is mixed w/ 1 part 0.1M NaOH

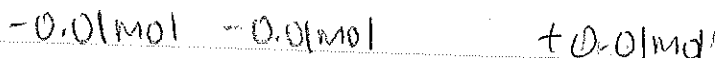
R



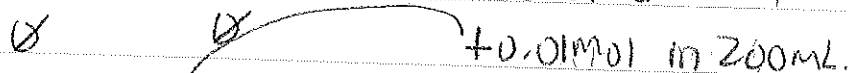
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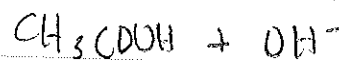
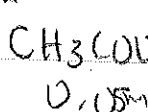
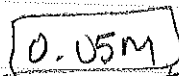
C



E



200mL



pH = 8.11

$K_b = \frac{[\text{CH}_3\text{COOH}][\text{OH}^-]}{[\text{CH}_3\text{COO}^-]}$

$5.56 \times 10^{-10} = \frac{x^2}{0.05}$

$K_b = \frac{K_w}{K_a} = \frac{1.0 \times 10^{-14}}{1.8 \times 10^{-5}} = 5.56 \times 10^{-10}$

$x = 5 \times 10^{-6}$

q. The pH of a solution of a soluble salt will be:  
- Any of the above, it depends on the salt.

q. The pH of 0.1 M aqueous solution of  $\text{NaCH}_3\text{COO}$  will be:

- **Basic**

because when you put in solution end up w/ acetate anion and  $\text{NaOH}$

$\text{NaCH}_3\text{COO}$  from strong base + <sup>weak</sup> acetic acid  $\rightarrow$  basic.

• Strong base + weak acid  $\rightarrow$  basic.

• Weak base + strong acid  $\rightarrow$  acidic.

$\text{NH}_4\text{Cl}$



• Strong acid + strong base  $\rightarrow$  neutral solution.

Conjugate partners have no  $K_a$  &  $K_b$  so they are not going to come back to get.

$\text{NH}_4\text{Cl}$  acidic

$\text{NaOH}$  base

$\text{Na}_2\text{SO}_4$  neutral

critic acid.