

Acid Base Preliminary Quiz
Titration and Buffers #8: 5, 6, 7, 8

#8-4 _____ 1 #8-5 _____ /6 #8-6 _____ /5 _____ /12

1. (#8-5) Which of the following statements is true regarding 10mL sample of a 0.1M NH_4Cl being poured into a 10mL sample of 0.1M NaOH

- I. The reaction mixture will be neutral. *N*
- II. This reaction will produce NH_3 . *Y*
- III. The reaction will produce a basic salt. *Y*

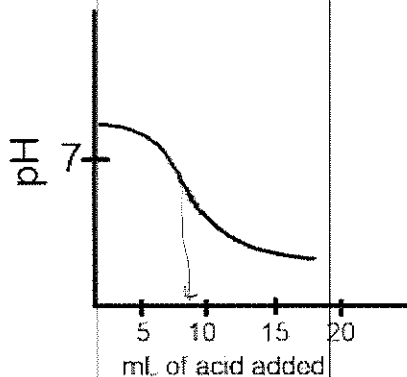
- a. I only
- b. I and II only
- c. II and III only
- d. I, II, and III

2. (#8-5) Ammonia $K_b = 1.8 \times 10^{-5}$

10 mL of 0.1M of NH_3 is added to 10mL of 0.1M HCl. Which of the following is true of the mixture.

- I. The solution is neutral. *N*
- II. The mixture is said to be at the equivalence point. *Y*
- III. $[\text{Cl}^-] = 0.05\text{M}$ after reaction is complete. *Y*

- a. I only
- b. II and III only
- c. I and III only
- d. I, II and III



15 ml of unknown is titrated to determine the concentration.

3. (#8-6) The unknown substance being titrated is

- a. a strong base
- b. a weak base
- c. a weak acid
- d. a strong acid

4. (#8-6) The equivalence point of this graph is at

- a. at 7 mL
- b. at 10 mL
- c. 15mL
- d. 20 mL

5. (#8-6) What is the concentration of the unknown?

- a. Equal to the known.
- b. slightly less than known.
- c. slightly more than known
- d. half as concentrated as known

6. (#8-5) AlCl_3 is an acidic solution. Which of the following is true.

- I. An aluminum ion will create an acidic solution by hydrolysis. *Y*
- II. The substance will neutralize NaOH. *Y*
- III. $[\text{Al}^{3+}] > [\text{H}_3\text{O}^+] > [\text{OH}^-]$. *Y*

- a. I only
- b. I and II only
- c. III only
- d. I, II and III only

X
 $\frac{1007}{1015}$

Short Answer

$K_b = NH_3 = 1.8 \times 10^{-5}$

7.

During a titration, 12mL of a (.5M) HCl was needed to reach equivalence when testing an unknown 10mL of acetate CH_3COO^{-1} (?M) solution. K_a for $CH_3COOH = 1.8 \times 10^{-5}$

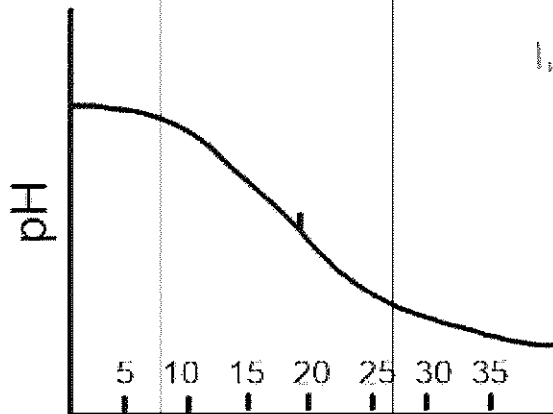
1. What is the $[CH_3COO^{-1}]$?
2. What is the pH at the equivalence?
3. What is the pH after 5mL of HCl has been added?

$$.5 = \frac{x}{.012} \quad x = \frac{.006}{.01} = \boxed{0.6M}$$

8.



	1.006	0	
	- .0025	+ .0025	
	1.0035	.0025 / .007	
I	0.5	0.35	
B	-x	+x	+x
E	.5-x	.35+x	x



$$2) \frac{.006m}{.022L} = 0.27M$$

$$1.85 \times 10^{-5} = \frac{x^2}{.27}$$

$$x = 2.2 \times 10^{-3}M$$

$$-\log(x) = \boxed{2.6}$$

$.5 = \frac{x}{.005} \quad x = .0025$
 5 mL + 12 mL = 17 mL mL of 0.1M acid added

15ml of unknown base is titrated. Answer the following questions.

a. What is molarity of unknown?

$$.1 = \frac{x}{.02} = x = .002 \quad \frac{.002}{.015} = \boxed{0.13M}$$

b. The pH at the equivalence is 5.50. What is the kb for the reaction?

$K_b \cdot K_a = K_w$

$$\frac{1.0 \times 10^{-14}}{1.85 \times 10^{-5}} = 5.4 \times 10^{-10}$$

$$5.4 \times 10^{-10} = \frac{.35 \cdot x}{.5}$$

$$x = 7.72 \times 10^{-10}$$

$$-\log(x) = 9.11$$

$$14 - 9.11 = \boxed{4.88}$$

#3



	1.002	0	0
	-.035	+x	+x
I	0.035		
S	+x		
E	.057	x	x

$10^{-5.5} = 3.16 \times 10^{-6}$

$$K_a = \frac{(3.16 \times 10^{-6})^2}{.0569} = 1.75 \times 10^{-10}$$

$$K_b = \boxed{5.6 \times 10^{-5}}$$