Name: _____ Class: _____ Date: _____ ID: A

Acid Base: Multiple choice Practice Standard #8

Multiple Choice
Identify the letter of the choice that best completes the statement or answers the question.

____ 1. (last modified 6-1-04)
Which is a polyprotic acid in water?
I. $Ca(NO_3)_2$
II. Na_2HPO_4
III. H_3AsO_4
a. I only
b. III only
c. II and III only
d. I and II only
e. I, II, and III

B 2. (#8-5) Consider the three acids: HF, HSO_4^-, and $H_2PO_4^-$
Which list includes only conjugate bases of the acids given above?
a. OH^-, HPO_4^{3-}
b. F^-, SO_4^{2-}, and HPO_4^{2-}
c. OH^-, SO_4^{2-}, and PO_4^{3-}
d. OH^-, SO_4^{2-}, and HPO_4^{2-}
e. H_2F^+, H_2SO_4, and H_3PO_4

____ 3. (#8-5)
Which is always a product in an Arrhenius neutralization reaction carried out in a water solution at 298K
I. a salt
II. additional water
III. a solution whose pH is 7
a. I only
b. III only
c. II and III only
d. I and II only
e. I, II, and III

____ 4. (#8-3)
Which applies to a concentrated solution (15M) of NH_3 in water?
Kb = 1.8E-5 for NH_3 in water at 298K
I. $[OH^-] = [H_3O^+]$
II. The percent ionization of NH_3 is nearly 100%
III. Of all ions and molecules present, the greatest number is water molecules
a. I only
b. III only
c. II and III only
d. I and II only
e. I, II , and III

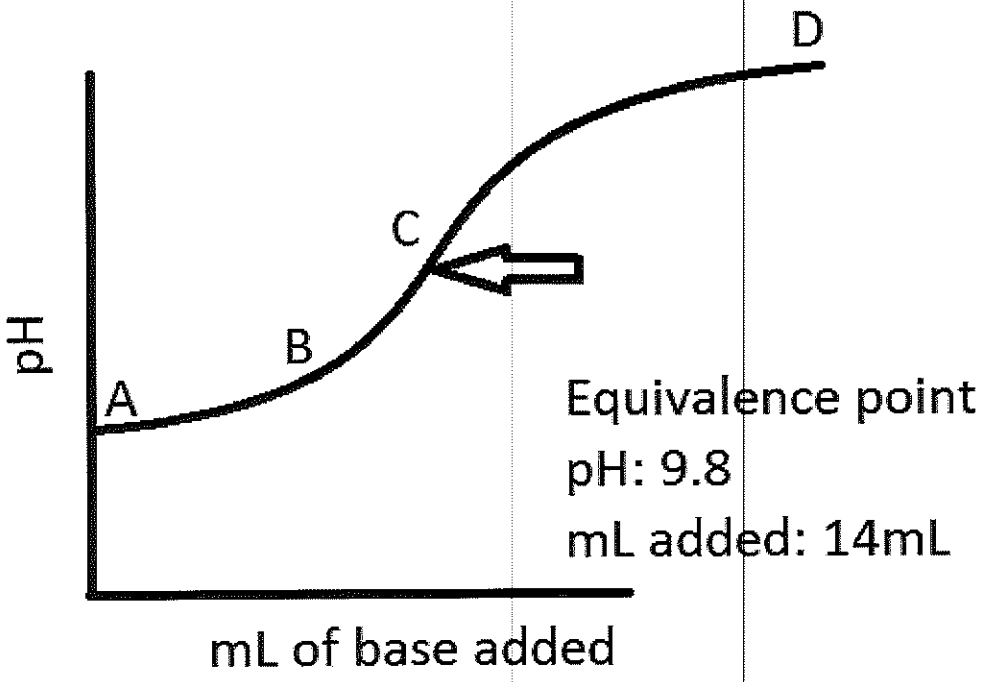
____ 5. (#8-3) Which relationship gives a correct description of some of the species found in an aqueous solution of acetic acid, CH_3COOH?
Ka = 1.8×10^{-8} for acetic acid
a. $[CH_3COO^-] < Ka$
b. $[CH_3COO^-] = [OH^-]$
c. $[CH_3COO^-] > [H_2O]$
d. $[CH_3COO^-] = [H_3O+]$
e. $[CH_3COO^-] > [CH_3COOH]$

____ 6. (#8-3)Which is the best comparison of the total number of ions present in separate 1.0M solutions of these compounds: $K_2C_2O_4$, KHC_2O_4 , $H_2C_2O_4$
a. $K_2C_2O_4 = KHC_2O_4 = H_2C_2O_4$
b. $K_2C_2O_4 = KHC_2O_4 > H_2C_2O_4$
c. $K_2C_2O_4 > KHC_2O_4 > H_2C_2O_4$
d. $K_2C_2O_4 = KHC_2O_4 < H_2C_2O_4$
e. $K_2C_2O_4 > KHC_2O_4 = H_2C_2O_4$

____ 7. (#8-5) Which range includes the pH that results when 0.10 mole NaOH is added to 100 ml of 1.0M HCl solution? (pencil out the math)

a. between 1 and 4
b. between 4 and 6.5
c. between 6.5 and 7.5
d. between 7.5 and 10
e. between 10 and 14

In a titration 20mL of acid is titrated with .1M NaOH. The results were listed below.



____ 8. (#8-6) At point A in the titration the species in highest concentration is (see graph)

a. HX
b. X^-
c. H_3O^+
d. OH^-

____ 9. (#8-6) The concentration of the acid is (see graph)

a. 0.7M
b. .07
c. .007
d. 7

____ 10. (#8-6) At what point will the H^+ = HX (see graph)

a. A
b. B
c. C
d. D

____ 11. (#8-6) The conjugate of the acid is a(see graph)

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

Acid (HX) has a Ka value of 1.5E-4.

____ 12. (#8-4) A .5M concentration of HX will have a pH in the range of

a. 0-3
b. 4-6
c. 8-11
d. 12-14

____ 13. (#8-6) If HX and X^- are present in the same concentrations the pH range will be
a. 4-6
b. 7
c. 8-11
d. 12-14

____ 14. (#8-6) 0.5M of NaX will have a pH range in the
a. 3-6
b. 7
c. 8-11
d. 12-14

____ 15. (8-2) If [HX] < [X^-] the reaction will be
a. basic
b. acidic
c. weakly basic
d. depends on concentrations.

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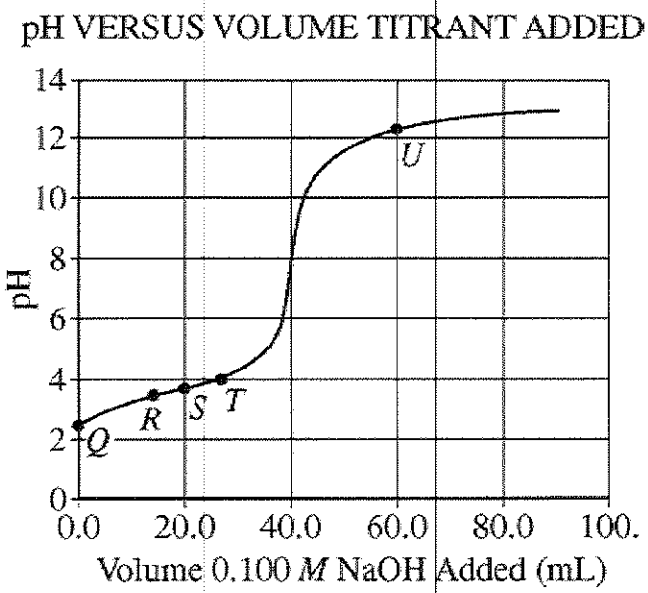
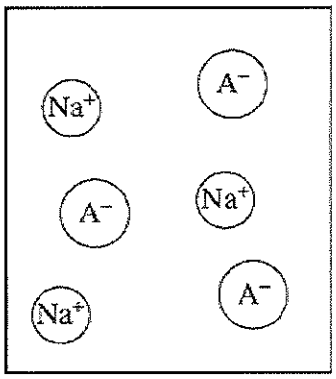


A 50.0 mL sample of a Weak acid, HA, of unknown molarity is titrated, and the pH of the resulting solution is measured with a pH meter and graphed as a function of the volume of 0.100 *M* NaOH added.

C 16. (#8-6) Which of the following is the best particulate representation of the species (other than H2O) that are present in significant concentrations in the solution at point *U* in the titration?

a.



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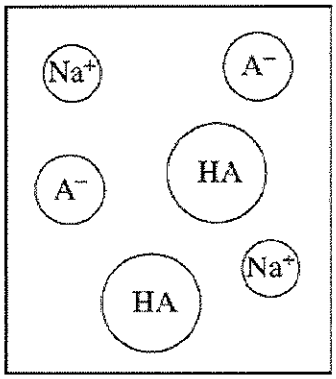

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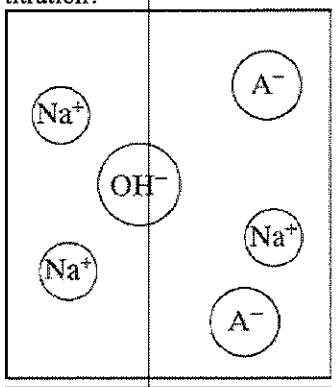
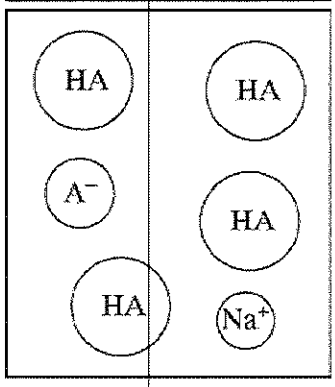


d.



____ 17. (#8-6)Is the acid being titrated more or less concentrated then base?
a. More, because the volume of the base is less then the volume of acid at equivalence.
b. Less, because the volume of the base is less then the volume of acid at equivalence
c. More, because the volume of the acid is less then the volume of base at equivalence
d. less, because the volume of the acid is less then the volume of base at equivalence

____ 18. (#8-6)At point *Q* in the titration, which of the following species has the highest concentration?

a. HA
b. A^-
c. H_3O^+
d. OH^-

____ 19. (#8-6) How many mL are needed to match the moles of acid with moles of base?
a. 10
b. 20
c. 30
d. 40

____ 20. (#8-4) A substance has a Ka of 1.0 E-7. If equal concentrations of this acid/conjugate base are measured for pH the meter will measure
a. 1.0
b. 3.0
c. 7.0
d. 14.0

____ 21. (8-4) A substance has a Ka of 1.0 E-7. If the concentration of the acid is greater then the concentration of the base the resulting pH will be
a. acidic, due to concentration only
b. basic, due to the concentration and larger Kb
c. 7.0, due to Ka only
d. 14.0 due to concentration and larger Kb

____ 22. (#8-3) A solution has a [HA] = 1M and an $[A^-]$ = 2M and the solution is measuring a pH of 5.5. Which of the following is true?
a. nonsense. This solution must be basic.
b. The solution is actually basic, the pH is just reading the pOH.
c. The solution is acidic due to a higher Kb of the conjugate base
d. The solution is acidic due to a higher Ka of the acid.

The pH of solutions of four acids prepared at various concentrations were measured and recorded in the table above. The four acids are, in no particular order, chlorous, hydrochloric, lactic, and propanoic.

Concentration (*M*)	pH of Acid 1	pH of Acid 2	pH of Acid 3	pH of Acid 4
0.010	3.44	2.00	2.92	2.20
0.050	3.09	1.30	2.58	1.73
0.10	2.94	1.00	2.42	1.55
0.50	2.69	0.30	2.08	1.16
1.00	2.44	0.00	1.92	0.98

____ 23. (#8-2) For which acid is the value of the aciddissociation constant, K_a, the smallest?

a. 1
b. 2
c. 3
d. 4

____ 24. (#8-3) Which of the following acids is HCl?

a. 1
b. 2
c. 3
d. 4

____ 25. A 25 mL sample of a 1.0 *M* solution of acid 1 is mixed with 25 mL of 0.50 *M* NaOH. Which of the following best explains what happens to the pH of the mixture when a few drops of 1.0 *M* HNO_3 are added?

a. The pH of the mixture increases sharply, because HNO_3 is a strong acid.
b. The pH of the mixture decreases sharply, because H_3O^+ ions were added.
c. The pH of the mixture stays about the same, because the conjugate base of acid 1 reacts with the added H_3O^+ ions.
d. The pH of the mixture stays about the same, because the OH^{-1} ions in the solution react with the added H_3O^+ ions.

____ 26. (#8-4) Of the following species, which has the greatest concentration in a 1.0 *M* solution of acid 1 at equilibrium?

a. OH^{-1}
b. H_3O^+
c. Acid 1
d. The conjugate base of acid 1

____ 27. (#8-5) If equal volumes of the four acids at a concentration of 0.50 *M* are each titrated with a strong base, which will require the greatest volume of base to reach the equivalence point?

a. acid 1
b. acid 2
c. acid 3
d. All the acids will require the same volume of base to reach the equivalence point.