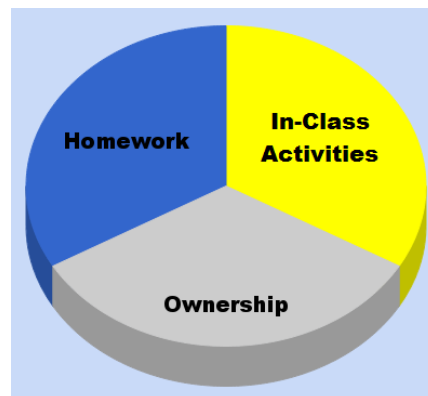


Monday Name: _____

Wednesday Name: _____

Directions: Standard directions.



- 1) If a solution of 0.5 M HOAc dissociates as follows: $\text{HOAc} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{OAc}^-$, what is the final $[\text{H}_3\text{O}^+]$ in the solution? K_a for HOAc = $1.8 \cdot 10^{-5}$.
- 2) What is the pH of the above solution?
- 3) What is the K_b for HOAc?
- 4) If a solution of 0.25 M HA dissociates as follows: $\text{HA} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{A}^-$, what is the final $[\text{H}_3\text{O}^+]$ in the solution? K_a for HA = $5.4 \cdot 10^{-7}$.

5) What is the pH for the above solution?

6) What is the K_b for HA?

7) If a solution of 1.3 M H_2M dissociates as follows: $H_2M + 2H_2O \rightleftharpoons 2H_3O^+ + M^{2-}$, what is the $[H_3O^+]$ of the solution? K_a for $H_2M = 2 \cdot 10^{-8}$.

8) What is the pH of the above solution?

9) What is the K_b for H_2M ?

10) Prove that $K_a K_b = K_w$.

11) Mark the pH with "A" for Acidic, "B" for Neutral or "C" for Alkaline or Basic:

A) 2.5 B) 6.8 C) 10 D) 12 E) 7.0 F) 9.4

G) 6 H) 14 I) 3.5 J) 4 K) 1.5 L) 13.6

12) Calculate the $[H_3O^+]$ for all of the above pH's in #11.

13) Determine the equivalent weight for the following compounds; name the compounds:

A) HCl

B) Ba(OH)₂

C) MgSO₄

D) AlF₃

E) SrCl₂

F) LiOAc

G) H₂SO₄

H) H₃PO₄

14) 20 g NaOH are dissolved in 1 L H₂O. What is the N of the NaOH solution?

15) 25 g HCl are dissolved in 500 mL of water. What is the N of the HCl solution?

16) 30 g $\text{Sr}(\text{OH})_2$ are dissolved in 750 mL water. What is the N of the $\text{Sr}(\text{OH})_2$ solution?

17) 150 g H_2SO_4 are dissolved in 750 mL water. What is the N of the H_2SO_4 solution?

18) 75 g BaSO_4 are dissolved in 3 L H_2O . What is the N of the BaSO_4 solution?

19) A solution of HA and A^- is at a pH of 6.4. If the $[\text{HA}] = 0.4 \text{ M}$ and the $[\text{A}^-] = 0.25 \text{ M}$, what is the pK_a for HA?

20) A solution of HB and B^- is at a pH of 8.5. If the $[\text{HB}] = 0.05 \text{ M}$ and the $[\text{B}^-] = 0.15 \text{ M}$, what is the pK_a for HB?

21) A solution of HC and C⁻ is at a pH of 7. If the [HC] = 0.5 M and the [C⁻] = 0.5 M, what is the pK_a for HC?

22) A solution of HA and A⁻ is at a pH of 12. If the [HA] = 0.01 M and the [A⁻] = 0.75 M, what is the pK_a for HA?

23) A solution of HA and A⁻ is at an unknown pH. The K_a for HA is $7.2 \cdot 10^{-8}$. If [HA] = 0.5 M and [A⁻] = 0.125 M, what is the pH of the solution?

24) Define Arrhenius acids and bases.

25) Define Bronsted-Lowry acids and bases.

26) Define Lewis acids and bases.

27) Describe the 5 forms of hydrates and give examples where possible.

28) Identify from which acids the following salts were obtained; name the salt:

A) K_2SO_4

B) $LiCl$

C) $AlPO_4$

D) $MgSO_4$

E) $Al_2(SO_4)_3$

F) BPO_4

G) SrCl_2

H) NaOCl

I) $\text{Be}_3(\text{PO}_4)_2$

J) $\text{Mg}(\text{NO}_3)_2$

K) NaNO_3

L) KNO_3

29) Define buffers and what the effective range of a buffer is.

30) What is the effective indicator range of an acid-base indicator?

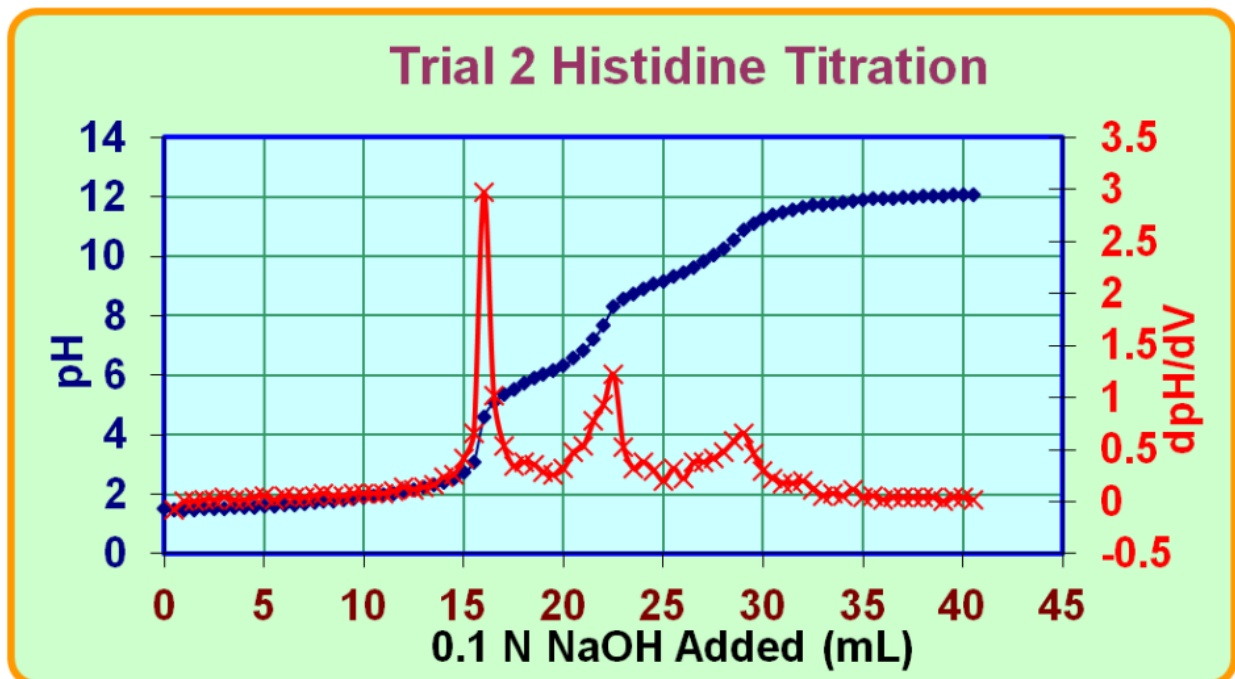
31) Draw and label a titration curve for a monoprotic acid.

32) Draw and label a titration curve for a diprotic acid.

33) Draw and label a titration curve for a tri-protic acid.

34) Draw, label and illustrate how you'd use the first derivative to determine the 3 pK values for a triprotic acid. You may need colored pencils to make this legible.

35. Using the following titration curve of a triprotic acid:



Determine the following:

- A) How many endpoints are there in this titration?

- B) At approximately what volume is each endpoint?

- C) What is the approximate value for pK_1 ?

- D) What is the approximate value for pK_2 ?

- E) What is the approximate value for pK_3 ?