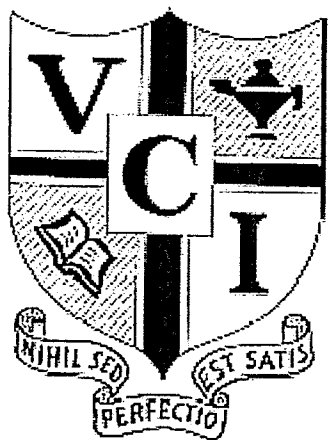


Science Notebook



40S

Chemistry

Acid and Base Equilibrium

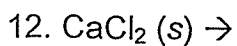
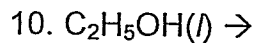
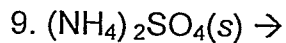
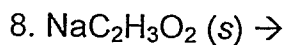
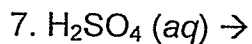
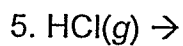
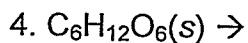
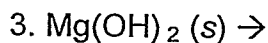
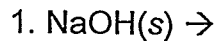


Student Name: _____ Date: _____

40S Chemistry

Ionic Equilibrium Electrolytes and Non-Electrolytes

Write the dissociation of each of the following in water. Predict whether each of the following will be an electrolyte or non-electrolyte.

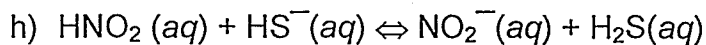
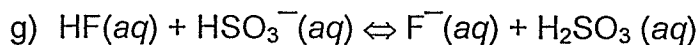
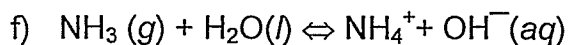
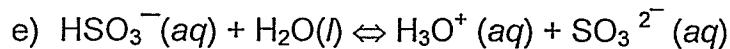
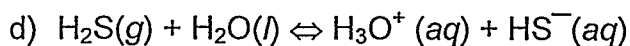
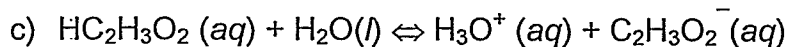
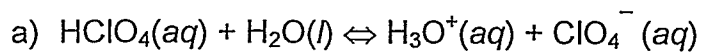


Student Name: _____ Date: _____

40S Chemistry

Ionic Equilibrium Conjugate Acid-Base Assignment

1. Identify the acid, base, conjugate acid/base for each of the following.

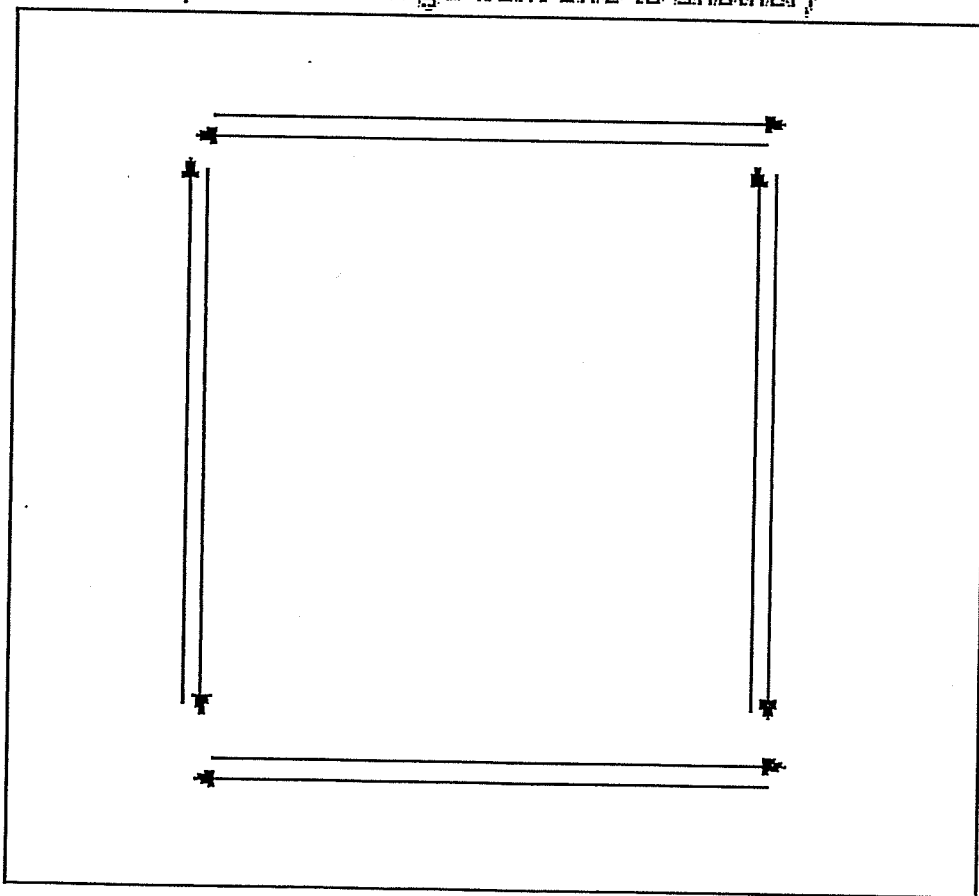


Student Name: _____ Date: _____

40S Chemistry

Ionic Equilibrium pH Square

(Know how to go from one to another)



Student Name: _____

Date: _____

40S Chemistry

Ionic Equilibrium pH Questions

Answer each question on in your Chemistry notebook. Show all of your work for each question.

- If the hydroxide ion concentration of an aqueous solution is 1.0×10^{-3} mol/L, what is the $[H^+]$ in the solution? Is the solution acidic, basic, or neutral?
- Determine the pH of the following solutions.
 - $[H^+] = 1 \times 10^{-6}$ mol/L
 - $[H^+] = 0.0001M$
 - $[OH^-] = 1 \times 10^{-2}$ mol/L
 - $[OH^-] = 1 \times 10^{-11}$ mol/L
- What are the hydrogen ion concentrations for solutions with the following pH values?
 - 4.0
 - 11.0
 - 8.0
- What are the hydroxide ion concentrations for solutions with the following pH values?
 - 6.0
 - 9.0
 - 12.0
- Calculate the pH of each of the following solutions.
 - $[H^+] = 1 \times 10^{-4}$
 - $[H^+] = 0.001$
 - $[H^+] = 1 \times 10^{-9}$
 - $[H^+] = 100 \times 10^{-12}$
- Calculate the pH for each solution.
 - $[H^+] = 5.0 \times 10^{-6}$
 - $[H^+] = 8.3 \times 10^{-10}$
 - $[OH^-] = 2.0 \times 10^{-5}$
 - $[OH^-] = 4.5 \times 10^{-11}$
- Calculate the $[H^+]$ for each solution.
 - pH = 5.0
 - pH = 5.80
 - pH = 12.20
 - pH = 2.64

Student Name: _____ Date: _____

40S Chemistry

Ionic Equilibrium K_w Problems

Answer all questions in your Chemistry notebook. Show all work.

1. What is the hydroxide ion concentration in a solution with a hydronium concentration of 6.80×10^{-10} mol/L?
2. What is the $[\text{H}_3\text{O}^+]$ in a solution with $[\text{OH}^-]$ of 5.67×10^{-3} ?
3. If the $[\text{H}_3\text{O}^+]$ in a nitric acid solution is 0.0020 mol/L, what is the $[\text{OH}^-]$?
4. If the $[\text{OH}^-]$ in a sodium hydroxide solution is 0.050 mol/L, what is $[\text{H}_3\text{O}^+]$?
5. 0.25 moles of hydrogen chloride gas is dissolved in 2.0 L of water. Write the dissociation equation for this gas and calculate both $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$.
6. 10.0 g of lithium hydroxide is dissolved in 750 mL of water. Write the dissociation equation and calculate both $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$.
7. 10.0 g of calcium hydroxide is dissolved in 400.0 mL of solution. Write the dissociation equation and calculate both $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$.
8. If the $[\text{H}_3\text{O}^+]$ of a barium hydroxide solution is 1.0×10^{-13} mol/L, calculate the $[\text{OH}^-]$. How many grams of barium hydroxide must have been used to make a Litre of this solution?
9. Calculate the $[\text{H}_3\text{O}^+]$ in milk of magnesia (magnesium hydroxide) that has an $[\text{OH}^-]$ of 1.43×10^{-4} mol/L.
10. If $[\text{OH}^-] = 4.5 \times 10^{-10}$ mol/L, calculate the K_a for a weak acid in a solution of 0.800 mol/L of an acid HB.

Student Name: _____ Date: _____

40S Chemistry

Ionic Equilibrium Ka Problems

Answer each of the following on loose leaf paper.

1. A 0.00100 M acetic acid solution, $\text{HC}_2\text{H}_3\text{O}_2$, has an $[\text{H}_3\text{O}^+]$ of 1.27×10^{-4} M. Find pH and K_a .
2. A 0.100 M nitrous acid solution, HNO_2 , has an $[\text{H}_3\text{O}^+]$ of 7.85×10^{-6} M. Find pH and K_a .
3. The $[\text{H}_3\text{O}^+]$ of a weak acid is 0.40 M. Find K_a of a 10.4 M solution.
4. A 5.50 M HX solution has a pH of 2.00. What is the $[\text{H}_3\text{O}^+]$? What is K_a ?
5. A 0.00100 M acetic acid solution, $\text{HC}_2\text{H}_3\text{O}_2$, has a pH of 3.40. What is the $[\text{H}_3\text{O}^+]$? What is K_a ?
6. In a 0.300 M HX solution, find $[\text{H}_3\text{O}^+]$ and K_a if the pH = 1.95.
7. In a 0.00700 M aqueous ammonia solution, the $[\text{OH}^-] = 3.46 \times 10^{-4}$ M. Find pH and K_b .
8. A 0.670 M HX solution has an $[\text{H}_3\text{O}^+]$ of 2.00×10^{-5} M. Find pH and K_a .
9. A 0.16 M weak acid, HB, has a pH of 2.50. Calculate $[\text{H}_3\text{O}^+]$ and K_a .
10. Find the $[\text{H}_3\text{O}^+]$ and pH of a 0.0100 M solution of the weak acid HB. $K_a = 5.75 \times 10^{-10}$.
11. Find the $[\text{H}_3\text{O}^+]$ and pH of a 0.153 M HY solution. $K_a = 3.20 \times 10^{-8}$.
12. What is the pH of 1.20 M HNO_2 if $K_a = 4.00 \times 10^{-4}$.
13. Calculate the pH for 0.0500 M $\text{HC}_2\text{H}_3\text{O}_2$ if $K_a = 1.80 \times 10^{-5}$.
14. Find the $[\text{H}_3\text{O}^+]$ and pH of a 4.00 M HX solution. $K_a = 3.60 \times 10^{-4}$.
15. Find the pH of a 0.200 M HX solution. $K_a = 1.50 \times 10^{-4}$.

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405 Chemistry

Ionic Equilibrium Percent of Ionization

Answer each of the following on loose leaf paper.

1. A 0.00100 M acetic acid solution, $\text{HC}_2\text{H}_3\text{O}_2$, has an $[\text{H}_3\text{O}^+]$ of 1.27×10^{-4} M. Calculate the percent of ionization.
2. A 0.100 M hydrochloric acid solution, HCl , has an $[\text{H}_3\text{O}^+]$ of 7.85×10^{-6} M. Calculate the percent of ionization.
3. The $[\text{H}_3\text{O}^+]$ of a weak acid is 0.40 M. Calculate the percent of ionization of a 10.4 M solution.
4. A 5.50 M HX solution has a pH of 2.00. What is the $[\text{H}_3\text{O}^+]$? Calculate the percent of ionization.
5. A 0.00100 M acetic acid solution, $\text{HC}_2\text{H}_3\text{O}_2$, has a pH of 3.40. What is the $[\text{H}_3\text{O}^+]$? What is K_a ?
6. In a 0.300 M HX solution, find $[\text{H}_3\text{O}^+]$ and K_a if the $\text{pH} = 1.95$. Calculate the percent of ionization.
7. In a 0.00700 M aqueous ammonia solution, the $[\text{OH}^-] = 3.46 \times 10^{-4}$ M. Calculate the percent of ionization.
8. A 0.670 M HX solution has an $[\text{H}_3\text{O}^+]$ of 2.00×10^{-5} M. Calculate the percent of ionization.
9. A 0.16 M weak acid, HB , has a pH of 2.50. Calculate $[\text{H}_3\text{O}^+]$. Calculate the percent of ionization.
10. Find the $[\text{H}_3\text{O}^+]$ and pH of a 0.0100 M solution of the weak acid HB . $K_a = 5.75 \times 10^{-10}$. Calculate the percent of ionization.

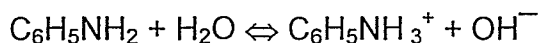
Student Name: _____ Date: _____

40S Chemistry

Ionic Equilibrium Acid-Base Calculations

Answer all questions in the space provided in your Chemistry notebook.
Show all work.

1. Calculate the concentration of all species in a 0.70 mol/L HNO_3 solution.
2. Determine the concentration of $[\text{H}_3\text{O}^+]$ in a 0.90 mol/L solution of a weak acid H_2S . ($K_a = 1.0 \times 10^{-7}$)
3. Find the concentration of all species in a 0.10 mol/L solution of NaOH .
4. Determine the concentration of all species in a 0.65 mol/L solution of a weak base NH_3 , if the base dissociation constant is 1.8×10^{-5} .
5. Find the concentration of $[\text{H}_3\text{O}^+]$ in a 0.86 mol/L solution of the weak acid H_2O_2 . ($K_a = 2.4 \times 10^{-12}$)
6. If $[\text{H}_3\text{O}^+] = 4.5 \times 10^{-6}$ mol/L in a 0.45 mol/L solution of the weak acid HX , calculate percent dissociation.
7. Find the percent dissociation in a 0.87 mol/L solution of the weak base HPO_4^{2-} if K_b is 1.6×10^{-7} .
8. Calculate the $[\text{H}_3\text{O}^+]$ of a 0.38 mol/L weak acid that is dissociated 0.12%.
9. Determine the K_a for an acid, HA , if a 0.45 mol/L solution is dissociated 0.025%.
10. Calculate the original concentration of the weak base, $\text{C}_2\text{H}_3\text{O}_2^-$ (acetate ion), if $[\text{OH}^-] = 1.5 \times 10^{-5}$ and $K_b = 5.6 \times 10^{-10}$.
11. Calculate the percent dissociation of a 0.60 mol/L aniline ($\text{C}_6\text{H}_5\text{NH}_2$) solution ($K_b = 3.8 \times 10^{-10}$) if it dissociates according to the following equation:



12. Determine the K_a for an acid HA if a 0.750 mol/L solution is dissociated 0.015%.

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405 Chemistry

Ionic Equilibrium Neutralization Reactions

Write a complete balanced equation for each of these acid-base reactions. Give the names of the salts produced. An example is completed for you.

example: HNO_3 with KOH :



1. HCl with $\text{Mg}(\text{OH})_2$:

2. H_2SO_4 with NH_4OH :

3. HCl with NH_4OH :

4. H_2SO_4 with NaOH :

5. H_3PO_4 with $\text{Ca}(\text{OH})_2$:

6. HNO_3 with $\text{Mg}(\text{OH})_2$:

7. NaOH with HNO_3 :

8. HBr with $\text{Ca}(\text{OH})_2$:

9. $\text{Mg}(\text{OH})_2$ with HCl :

10. H_3PO_4 with NaOH :

