

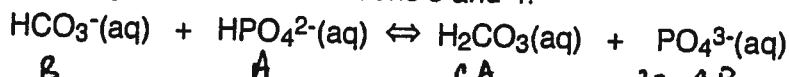
## AP Chemistry Review Targets 1-6

**Directions:** Answer each of the following questions. Place your answers on the provided blanks. This is an open note quiz.

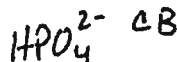
1. List the conjugate base of  $\text{CH}_3\text{COOH}$ .  $\text{CH}_3\text{COO}^-$

2. List the conjugate acid of  $\text{H}_2\text{AsO}_4^-$ .  $\text{H}_3\text{AsO}_4$

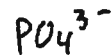
Consider the following reaction for Questions 3 and 4:



3. Identify the acid in the above reaction.



4. Identify the conjugate base in the above reaction.



5. Select all correct answers. According to Arrhenius, an acid is a substance that \_\_\_\_.

- a) is capable of donating one or more protons ✓
- b) causes an increase in the concentration of the  $\text{H}^+$  ions in solution ✓
- c) can accept a pair of  $e^-$  to form a coordinate covalent bond *not Arrhenius*
- d) reacts with the solvent to form a cation formed by the autoionization of water of that solvent *not Arrhenius*
- e) tastes bitter

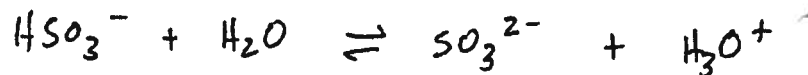
6. A substance is said to be amphoteric if it is capable of acting as both an acid and a base.

7. In an acidic solution, the  $[\text{H}_3\text{O}^+]$   $>$   $[\text{OH}^-]$ . Fill in the blank with  $<$ ,  $>$ , or  $=$ .

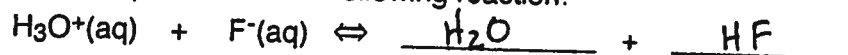
8.  $\text{HSO}_3^-(\text{aq})$  is an ion which is amphoteric. In the space below, write an equation for the reaction in which  $\text{HSO}_3^-(\text{aq})$  acts as a base in  $\text{H}_2\text{O}(\text{l})$ .



9. In the space below, write an equation for the reaction in which  $\text{HSO}_3^-(\text{aq})$  acts as an acid in  $\text{H}_2\text{O}(\text{l})$ .



10. Predict the products of the following reaction:



11. A solution has  $[H^+]$  of 0.00032 M. The  $[OH^-]$  is  $3.13 \times 10^{-11}$  M and the solution is acidic. (acidic, basic, or neutral)

12. What is the value for  $K_w$  at 25°C?  $1 \times 10^{-14}$

**For #13-23, show your work and then circle your final answers.**

13. How many times more acidic is a solution with a pH of 3.00 than a solution with a pH of 5.50?

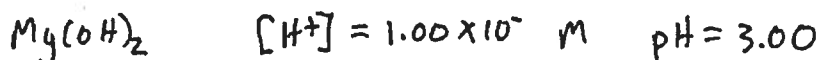
$$\begin{array}{ccccccc} 3 & \rightarrow & 4 & \rightarrow & 5 & \xrightarrow{5} & 6 \\ 10 & & 10 & & 10 & & \end{array} \quad 10 \times 10 \times 5 = 500 \times$$

14. If a solution has a pH of 4.52, then its  $[H^+]$  is  $3.02 \times 10^{-5}$  M.

$$10^{-4.52} \rightarrow$$

15. If a solution has a pOH of 10.80, its  $[H^+]$  is  $6.31 \times 10^{-4}$  M.

16. If a magnesium hydroxide solution has a  $[OH^-]$  of  $1.00 \times 10^{-11}$  M, then its pH is 3.00



17. Calculate the pH of a 0.0034 M solution of nitric acid.

$HNO_3$  is a strong acid!

$$[H^+] = 0.0034 \text{ M}$$

$$pH = -\log(0.0034) = \boxed{2.47}$$

18. Calculate the pOH of a solution made by dissolving 2.50 grams of  $HClO_3$  in enough water to make 2.50 L of solution.

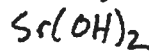
$$\frac{2.50 \text{ g}}{2.50 \text{ L}} \times \frac{1 \text{ mole } HClO_3}{84.54 \text{ g } HClO_3} = 0.0118 \text{ M} = [H^+]$$

$$pH = -\log(0.0118) = 1.928$$

$$pOH = 14 - 1.928 = \boxed{12.072}$$

19. Calculate the pH of a solution made by dissolving 14.0 g of strontium hydroxide in enough water to make 3.00 L of solution.

$$\frac{14.0 \text{ g}}{3.00 \text{ L}} \times \frac{1 \text{ mol } Sr(OH)_2}{121.62 \text{ g}} = .0384 \text{ M} \times 2 = .0768 \text{ M} = [OH^-]$$

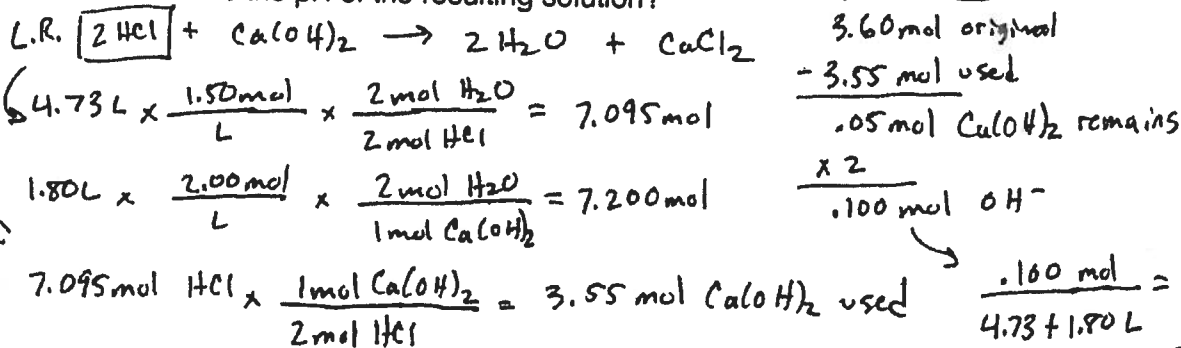


$$pOH = -\log(0.0768) = 1.115$$

$$pH = 14 - 1.115 = \boxed{12.885}$$

Limiting reactant problem!

20. Assume that you added 4.73 liters of 1.50 M HCl to 1.80 liters of 2.00 M Ca(OH)<sub>2</sub>. What would be the pH of the resulting solution?



Ch. 17  
molecular

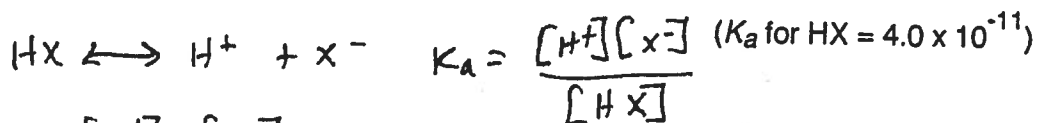
21. Assume you wanted to make 50.0 L of a sodium hydroxide solution that has a pH of 10.00. How many grams of sodium hydroxide would this require?

pH = 10.00 so  $[\text{H}^+] = 1.00 \times 10^{-10}\text{ M}$  and  $[\text{OH}^-] = 1.00 \times 10^{-4}\text{ M}$

$50.0\text{ L} \times \frac{1.00 \times 10^{-4}\text{ mol}}{\text{L}} \times \frac{40.0\text{ g NaOH}}{1\text{ mol NaOH}} = \boxed{.20\text{ g NaOH}}$

pOH = 1.85  
 $\boxed{\text{pH} = 12.19}$

22. What is  $[\text{H}^+]$  in a 0.10 M solution of HX, a weak acid, at 25°C?



$[\text{H}^+] = [\text{X}^-]$

so,  $4.0 \times 10^{-11} = \frac{x^2}{.10}$

$x = 20 \times 10^{-6}\text{ M}$

23. What is the % ionization of a 3.00 M acetic acid solution at 25°C? For acetic acid the is  $K_a = 1.8 \times 10^{-5}$ .

$1.8 \times 10^{-5} = \frac{x^2}{3.00}$

$x = .00735\text{ M}$

$\%I = \frac{.00735}{3.00} \times 100$

$= .245\%$