

## Acids and Bases Review

**I. Introduction to Acids and Bases**

1. List three properties of acids:

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

2. List three properties of bases:

- a. \_\_\_\_\_
- b. \_\_\_\_\_
- c. \_\_\_\_\_

3. Circle the correct acid name that goes with each of the following anions:

- a. carbonate ion +  $H^+$  -----> carbonic acid or carbonous acid
- b. chlorite ion +  $H^+$  -----> chloric acid or chlorous acid
- c. nitrite ion +  $H^+$  -----> nitric acid or nitrous acid
- d. nitrate ion +  $H^+$  -----> nitric acid or nitrous acid
- e. phosphate ion +  $H^+$  -----> phosphoric acid or phosphorous acid
- e. phosphite ion +  $H^+$  -----> phosphoric acid or phosphorous acid

**II. Defining Acids and Bases**

4. According to Arrhenius, what is

- a. an acid? \_\_\_\_\_
- b. a base? \_\_\_\_\_

5. Use structural diagrams to show what happens when an  $H^+$  ion encounters a molecule of water. (Be sure to show the lone electron pairs: they're the key to the whole thing!)

What do you call the new, positively charged ion? \_\_\_\_\_

### III. Concentrations

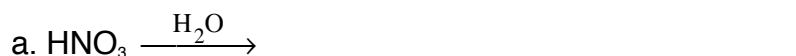
6. What is the formula for molarity? \_\_\_\_\_
7. If you used .398 moles of NaCl to make a 250. mL of solution, what would the molarity of the solution be?
8. If you used 4.77 grams of NaCl to make 1.59L of solution, what would the molarity be?
9. If you needed to make a 6.50M NaCl solution and you only had 75.0 grams of NaCl, how many mL of solution could you make?
10. How many grams of NaCl would it take to make 25.8 L of a 1.25M solution?

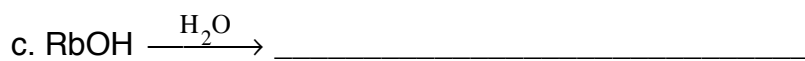
### IV. pH

11. What does  $[H^+]$  mean? \_\_\_\_\_
12. What does  $[OH^-]$  mean? \_\_\_\_\_
13. What is the  $[H^+]$  of pure water? \_\_\_\_\_ What is the  $[OH^-]$  of pure water? \_\_\_\_\_
14. What does pH stand for? \_\_\_\_\_
15. What does pOH stand for? \_\_\_\_\_
16. What is the pH range for a solution that is: \_\_\_\_\_ neutral \_\_\_\_\_ basic \_\_\_\_\_ acidic
17. Identify these as acidic, basic, or neutral
- a.  $[H^+] = [OH^-]$  \_\_\_\_\_
  - b.  $[H^+] > [OH^-]$  \_\_\_\_\_
  - c.  $[H^+] < [OH^-]$  \_\_\_\_\_

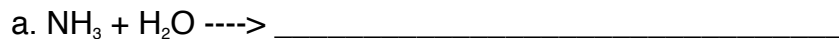
In all three of these situations,  $K_w = [H^+] [OH^-] = 1.0 \times 10^{-14} M^2$

18. Write out the dissociations of the following acids and bases:





19. What is the name of  $\text{NH}_3$ ? \_\_\_\_\_ Is it an acid or a base? \_\_\_\_\_



20. When you put some HCl into pure water the  $[\text{H}^+]$  goes up and the  $[\text{OH}^-]$  goes down. Use pictures to show **why** the  $[\text{OH}^-]$  goes down.

21. Complete the following table:

$[\text{H}^+]$	$[\text{OH}^-]$	pH	pOH
	$1.0 \times 10^{-3} \text{ M}$		
$1.0 \times 10^{-7} \text{ M}$			
		10	
.00000000100 M			
			2

22. What is the concentration of hydrogen ions in a 0.00001 M solution of NaOH?

23. What is the hydroxide ion concentration of .0001M  $\text{HNO}_3$ ?

24. What is the pH of a  $1.0 \times 10^{-5} \text{ M}$  solution of sulfuric acid? (Only one hydrogen comes off.)

25. What is the pOH of a  $1.0 \times 10^{-3} \text{ M}$  solution of hydrochloric acid?

26. What is the pH of a  $8.25 \times 10^{-2} \text{ M}$  solution of sulfuric acid? (Only one hydrogen comes off.)

27. What is the pOH of a  $3.33 \times 10^{-6} \text{ M}$  solution of hydrochloric acid?

28. What is the hydrogen ion concentration of a hydrobromic solution with a pH of 4.50?

29. What is the hydroxide ion concentration of a KOH solution with a pH of 13.22?

### V. Dilutions

30. What is the formula for dilutions? \_\_\_\_\_

a. Why does it work? \_\_\_\_\_

\_\_\_\_\_

31. If you have 3.00 L of a 9.00 M solution of HCl and you add it to 5.00 L of water, what's the molarity of the new solution?

32. How much water must you add to 350. mL of an 12.0 M solution of  $\text{H}_2\text{SO}_4$  to make it a 5.00 M solution?

33. How many mL of 1.55 M  $\text{H}_3\text{PO}_4$  are needed to prepare 250. mL of a .500 M solution?