Name: KEY (HONORS) Period: _____ Date: _____

Unit 13 Review: Acids & Bases (Pre-AP)

Answer the following questions. If you are missing any notes, they are posted on the website **www.msrobbinspnhs.weebly.com**

Are the following properties characteristics of acids, bases, or both?

Both 1. Can turn litmus paper a different color.

Acid 2. React with metals to produce H_2 gas.

Acid 3. Contain more hydrogen ions than hydroxide ions.

Base 4. Feel slippery.

Base 5. Hydrogen ion acceptors.

Base 6. Taste bitter.

Both 7. Conduct electricity.

Acid 8. Taste sour.

Base 9. pH ranges from 7 to 14.

Acid 10. Hydrogen ion donors.

11. a) Complete the reaction:

Acid + Base → SALT + WATER

b) What is this type of reaction called? Neutralization

12. Predict the products for the following acid-base reactions.

a) $HNO_3 + LiOH \rightarrow H_2O + LiNO_3$

b) $HCl + NaOH \rightarrow H_2O + NaCl$

c) $KOH + HBr \rightarrow H_2O + KBr$

13. Identify the conjugate acid-base pairs in the following reactions.

a) $HNO_3 + H_2O \rightarrow H_3O^+ + NO_3^-$

Acid: HNO_3 Conjugate Base: NO_3^-

Base: H_2O Conjugate Acid: H_3O^+

b) $CO_3^{2-} + H_2O \rightarrow HCO_3^- + OH^-$

Acid: H_2O Conjugate Base: OH^-

Base: CO_3^{2-} Conjugate Acid: HCO_3^-

14. Identify as an acid, base or salt.

a) H_2SO_4 A

b) NH_3 B

c) NaCl S

d) HF A

e) $(NH_4)_2CO_3$ S

f) $Ba(OH)_2$ B

15. a) Acids have pH values that range from 0 to 7.

c) Bases have pH values that range from 7 to 14.

d) Pure water has a pH of exactly 7.

16. Each step along the pH scale changes the hydrogen ion concentration by what factor? 10

17. Solutions that are acidic have higher H^+ concentrations than OH^- concentrations.

18. Find the pH of the solution and whether it is acidic, basic, or neutral.

	pH	Acidic/Basic/Neutral	
a) $[H^+] = 1 \times 10^{-6}$ *M*	6	ACID	
b) $[H^+] = 1 \times 10^{-12}$ *M*	12	BASE	
c) $[OH^-] = 1 \times 10^{-9}$ *M*	5	ACID	$[H^+] = 1 \times 10^{-5} M$
d) $[OH^-] = 1 \times 10^{-4}$ *M*	10	BASE	$[H^+] = 1 \times 10^{-10} M$

19. a) In a neutral solution, the $[H^+]$ and $[OH^-]$ are equal to $1 \times 10^{-7} M$.

b) In a basic solution, the $[H^+]$ is between 1×10^{-7} and 1×10^{-14}.

c) In an acidic solution, the $[H^+]$ is between 1×10^{-1} and 1×10^{-7}.

20. Water undergoes self-ionization according to the reaction below.

$H_2O + H_2O \rightarrow H_3O^+ + OH^-$

21. Which of these solutions is the most basic?

A. $[H^+] = 1 \times 10^{-2}$ *M*

B. $[H^+] = 1 \times 10^{-4}$ *M*

C. $[H^+] = 1 \times 10^{-11}$ *M*

(D.) $[H^+] = 1 \times 10^{-13}$ *M*

22. What is the H^+ concentration for the following solutions?

a) pH = 11.0 1×10^{-11}

b) pH = 5.0 1×10^{-5}

c) pOH = 8.0 1×10^{-6} pH = 6

d) pOH = 13.0 1×10^{-1} pH = 1

23. The hydronium ion concentration of a solution is 3.15×10^{-5} *M*.

a) What is the pH? $-\log(3.15\times10^{-5}) = 4.5$

b) What is the pOH? $14 - 4.5 = 9.5$

24. The hydrogen ion concentration of a solution is 0.0090 *M*.

a) What is the pH? $-\log(0.0090) = 2.0$

b) What is the pOH? $14 - 2.0 = 12$

25. What is the $[OH^-]$ of a solution with a $[H_3O^+]$ of 3.5×10^{-11} *M*?

$$[OH^-] = \frac{1\times10^{-14}}{3.5\times10^{-11}} = 2.9\times10^{-4}$$

26. What is the $[H^+]$ of a solution with a $[OH^-]$ of 3.2×10^{-4} *M*?

$$[H^+] = \frac{1\times10^{-14}}{3.2\times10^{-4}} = 3.1\times10^{-11}$$

27. What is the $[H^+]$ of a solution with a pH of 8.44?

$$[H^+] = 10^{-8.44} = 3.6\times10^{-9}$$

28. What is the $[OH^-]$ of a solution with a pH of 12.3?

$pOH = 14 - 12.3 = 1.7$ $\quad [OH^-] = 10^{-1.7} = 0.02\,M$

29. What is titration? A process used to determine the unknown conc. of a solution by using a measured amount of a standard soln.

30. The point in a titration when the indicator permanently changes color is called the end point.

31. In a titration, when the moles of H^+ are equal to the moles of OH^-, the equivalence point has been reached.

32. If 30.0 mL of KOH solution is titrated by 26.8 mL of 0.120 *M* $HClO_3$, what is the molarity of the KOH solution?

$$M_A V_A = M_B V_B$$

$$M_B = \frac{M_A V_A}{V_B} = \frac{(0.120)(26.8)}{(30.0)} = 0.11\ M\ KOH$$

33. How many milliliters of 0.545 M HCl will neutralize 43.6 mL of a 0.250 M NaOH?

$$V_A = \frac{M_B V_B}{M_A} = \frac{(0.250M)(43.6mL)}{(0.545M)} = 80\ mL\ HCl$$

34. If 12.5 mL of H_3PO_4 is titrated with 15.0 mL of 10.0 M NaOH, what is the molarity of the H_3PO_4 solution?

$$H_3PO_4 + 3\,NaOH \rightarrow H_2O + 3\,Na_3PO_4$$

$$\frac{M_A V_A}{a} = \frac{M_B V_B}{b}$$

$$M_A = \frac{M_B V_B a}{V_A b} = \frac{(10.0M)(15.0mL)(1)}{(12.5mL)(3)} = 4\ M\ H_3PO_4$$