Name_____

Date_____ Period_____

ACID AND BASE QUIZ

1. Write the correct chemical formula for each acid below. Label each acid as monoprotic, diprotic, or triprotic. Also, indicate how many ionizable hydrogens each acid contains.

   a. phosphorous acid

   b. carbonic acid

2. Why is water considered amphoteric?

3. a. Name 3 properties of an acid.

   b. Name 3 properties of a base.

4. Find the pH for solutions with the following measurements. Also indicate whether the solution is acidic, basic, or neutral:

   a. pOH= 8

   b. $[H^+]=2.45 \times 10^{-6}M$

   c. $[OH^-]=9.0 \times 10^{-13}M$

5. Find $[H^+]$ for the following:

   a. pH = 3.4

   b. pOH = 6

   c. $[OH^-] = 4.5 \times 10^{-4}$

6. Write the balanced equation for the mixing of hydrochloric acid (a strong acid) added to calcium hydroxide (a strong base). What type of reaction is this?

Name_____

Partner's Name_____

7. Fill in the correct term for the following statements.
   a. _____ is the point at which the #H^+ ions = #OH^-.
   b. _____ is the point at which the indicator changes color in a titration.

8. What is the conjugate base of each of the following acids?
   a. $HClO_4$ b. H_2S c. PH_4^+

9. What is the conjugate acid of each of the following bases?
   a. CN^- b. SO_4^{2-} c. H_2O

10. For each of the following reactions, label the acid, base, conjugate acid, and the conjugate base.
   a. $HNO_{2(aq)} + H_2O_{(l)} \Leftrightarrow NO_2^-{}_{(aq)} + H_3O^+{}_{(aq)}$

   b. $NH_{3(aq)} + H_2O_{(l)} \Leftrightarrow NH_4^+{}_{(aq)} + OH^-{}_{(aq)}$

11. Some commercials tout the benefits of buffered aspirin. Aspirin is the generic term for the compound acetylsalicylic acid. What could be a benefit of buffered aspirin?

12. What is the molarity of hydrochloric acid if 300.0ml of it is completely neutralized by 100.0ml of 2.50M sodium hydroxide solution?

13. How many milliliters of 1.50M hydrochloric acid will neutralize 100.0ml of 2.50M sodium hydroxide?

Name Sturman key
Date _____ Period ____

ACID AND BASE QUIZ

1. Write the correct chemical formula for each acid below. Label each acid as monoprotic, diprotic, or triprotic. Also, indicate how many ionizable hydrogens each acid contains.

+2 a. phosphorous acid

H_3PO_3
triprotic
3 ionizable H's

+2 b. carbonic acid

H_2CO_3
diprotic
2 ionizable H's.

+1 2. Why is water considered amphoteric?

Water can act as an acid or a base.

+3 (+½ each) 3. a. Name 3 properties of an acid.

1) sour
2) donate H^+
3) strong electrolyte
4) water
5) sour
6) reacts w/ metal

+3 b. Name 3 properties of a base.

1) bitter
2) donate OH^- (or accepts H^+)
3) strong electrolyte
4) causes indicators to Δ color

+4½ 4. Find the pH for solutions with the following measurements. Also indicate whether the solution is acidic, basic, or neutral:

a. pOH= 8

pH = 6
slightly acid

b. $[H^+]=2.45 \times 10^{-6}$M

$pH = -\log(2.45\times10^{-6})$
$= 5.61$ acidic

c. $[OH^-]=9.0 \times 10^{-13}$M

$pOH = -\log(9.0\times10^{-13})$
$= 12$
pH = 2 acidic

+3 5. Find $[H^+]$ for the following:

a. pH = 3.4

$-\log[H^+] = 3.4$
$\log[H^+] = -3.4$
$[H^+] = 10^{-3.4} = 4.0\times10^{-4}$M

b. pOH = 6

pH = 8
$[H^+] = 1.0\times10^{-8}$M

c. $[OH^-] = 4.5 \times 10^{-4}$

$pOH = -\log(4.5\times10^{-4})$
$= 3.3$
$pH = 14 - 3.3 = 10.7$
$[H^+] = 10^{-10.4} = 2.0\times10^{-11}$M

+2½ 6. Write the balanced equation for the mixing of hydrochloric acid (a strong acid) added to calcium hydroxide (a strong base). What type of reaction is this?

$2HCl_{(aq)} + Ca(OH)_{2(aq)} \longrightarrow 2H_2O_{(l)} + CaCl_{2(aq)}$

neutralization

+1 ½ credit

7. Fill in the correct term for the following statements.
   a. Equivalence pt is the point at which the #H^+ ions = #OH^-.
   b. End pt is the point at which the indicator changes color in a titration.

+3 8. What is the conjugate base of each of the following acids?
   a. $HClO_4$ ClO_4^- b. H_2S HS^- c. PH_4^+ PH_3

+3 9. What is the conjugate acid of each of the following bases?
   a. CN^- HCN b. SO_4^{2-} HSO_4^- c. H_2O H_3O^+

+2 10. For each of the following reactions, label the acid, base, conjugate acid, and the conjugate base.
   a. $HNO_{2(aq)} + H_2O_{(l)} \Leftrightarrow NO_2^-{}_{(aq)} + H_3O^+{}_{(aq)}$
   acid base conj base conj acid

+2 b. $NH_{3(aq)} + H_2O_{(l)} \Leftrightarrow NH_4^+{}_{(aq)} + OH^-{}_{(aq)}$
   base acid conj acid conj base

+1 11. Some commercials tout the benefits of buffered aspirin. Aspirin is the generic term for the compound acetylsalicylic acid. What could be a benefit of buffered aspirin?

Buffered aspirin contain buffering compounds which resists changing pH of the stomach. This can reduce side effects of discomfort & dissolving the stomach's lining.

+2 12. What is the molarity (M_2) of hydrochloric acid if 300.0ml (V_2) of it is completely neutralized by 100.0ml of 2.50M sodium hydroxide solution? (V_1, M_1)

$M_1V_1 = M_2V_2$

$2.50(100.0) = M_2(300.0)$

$M_2 = .833\ M\ HCl$

same as $M_1V_1 = M_2V_2$ when equivalents are the same.

+2 13. How many milliliters (V_1) of 1.50M (M_1) hydrochloric acid will neutralize 100.0ml (V_2) of 2.50M sodium hydroxide? (M_2)

$M_1V_1 = M_2V_2$

$1.5\ V_1 = 2.50(100.0)$

$V_1 = 166.66 \Rightarrow 167\ mL$