LOHS • AP Chemistry • Schrempp

Name _____
Period ___ Date ___/___/___

5 • Reactions In Aqueous Solution

PRACTICE TEST

1. On the basis of the solubility rules, which of the following is insoluble?
   a) K_2O
   b) Na_2CO_3
   c) PbS
   d) $(NH_4)_2SO_4$
   e) $Ba(C_2H_3O_2)_2$

2. In a double replacement reaction, formation of which of the following does not necessarily lead to a chemical change?
   a) $HC_2H_3O_2$
   b) AgCl
   c) CO_2
   d) H_2S
   e) NaCl

3. Reaction of an acid with a carbonate (such as $CaCO_3$) always results in the formation of
   a) O_2
   b) $C_{(diamond)}$
   c) CH_4
   d) O_3
   e) CO_2

4. Which of the following is incorrect?
   a) all salts containing NH_4^+ are soluble.
   b) all salts containing NO_3^- are soluble.
   c) all fluorides are soluble.
   d) all sulfates (except those of Ca^{2+}, Sr^{2+}, Ba^{2+}, and Pb^{2+}) are soluble.
   e) most hydroxides are insoluble, except those of Ca^{2+}, Sr^{2+}, Ba^{2+}, the alkali metals and NH_4+.

5. One of the gases shown below is NOT usually formed in a double replacement reaction. Which one?
   a) N_2
   b) CO_2
   c) SO_2
   d) NH_3
   e) H_2S

6. Write the balanced molecular equation for the reaction of washing soda, Na_2CO_3 and vinegar, $HC_2H_3O_2$.

7. The <u>net</u> ionic equation for the above reaction is:

8. How many moles of H^+ are associated with the acid, H_2SO_3, during neutralization?
   a) 0 b) 1 c) 2 d) 3

9. How many moles Al_2O_3 are needed to neutralize 1 mole of HCl?
   a) $^1/_3$
   b) $^2/_3$
   c) 2
   d) 6
   e) 12
   f) $^1/_6$

10. Write the <u>net</u> reaction that will occur when solid ammonium carbonate is added to a solution of hydrosulfuric acid.

11. When H_2SO_4 and $Ba(OH)_2$ are reacted in a double replacement reaction, one of the products of the reaction is…
    a) H_2
    b) H_2O
    c) BaS
    d) BaH_2
    e) SO_2

12. In the double replacement reaction between the weak acid, $HC_2H_3O_2$ and strong base, NaOH, which ion(s) are spectator ions?
    a) Na^+, $C_2H_3O_2^-$
    b) Na^+, OH^-
    c) OH^- only
    d) H^+, $C_2H_3O_2^-$
    e) Na^+ only

13. Which of the following is a base?
    a) KOH
    b) C_2H_5OH
    c) Br^-
    d) CH_3OH
    e) CO_2

14. Which of the following is a strong acid?
    a) H_2CO_3
    b) HF
    c) H_3PO_4
    d) $HClO_3$
    e) HNO_3

15. Which of the following is an acid in aqueous solutions?
    a) H_2CO_3
    b) Al_2O_3
    c) CH_4
    d) H_2O
    e) BaO

16. SO_2 turns into which acid in solution?
    a) HNO_3
    b) H_2SO_3
    c) H_2SO_4
    d) H_2S
    e) HNO_2

17. What is the oxidation number of C in CO_3^{2-}?
    a) +6
    b) +4
    c) +2
    d) +1
    e) –1

18. What is the oxidation number of Br in $KBrO_4$?
    a) +1 b) –1 c) +5 d) +7 e) +8

19. For each change below, label the change of the underlined element as **O**xidation, **R**eduction, or **N**either
    ___ $\underline{Cu}^{2+} \rightarrow \underline{Cu}^{\circ}$
    ___ $\underline{C}H_4 \rightarrow \underline{C}O_2$
    ___ $H_2\underline{O}_2 \rightarrow H_2\underline{O}$
    ___ $\underline{C}O_2 \rightarrow H_2\underline{C}O_3$

20. How many milliliters of 0.123 <u>M</u> NaOH solution contain 25.0 g of NaOH (molar mass = 40.00 g/mol)?
    a) 5.08 mL
    b) 50.8 mL
    c) 508 mL
    d) 625 mL
    e) 5080 mL

21. If you need 1.00 L of 0.125 <u>M</u> H_2SO_4, how would you prepare this solution?
    a) Add 950. mL of water to 50.0 mL of 3.00 <u>M</u> H_2SO_4.
    b) Add 500. mL of water to 500. mL of 0.500 <u>M</u> H_2SO_4.
    c) Add 750 mL of water to 250 mL of 0.375 <u>M</u> H_2SO_4.
    d) Dilute 36.0 mL of 1.25 <u>M</u> H_2SO_4 to a volume of 1.00 L.
    e) Dilute 20.8 mL of 6.00 <u>M</u> H_2SO_4 to a volume of 1.00 L.

22. What is the ion concentration in a 0.12 M solution of $BaCl_2$?
    a) $[Ba^{2+}]$ = 0.12 <u>M</u> and $[Cl^-]$ = 0.12 <u>M</u>.
    b) $[Ba^{2+}]$ = 0.12 <u>M</u> and $[Cl^-]$ = 0.060 <u>M</u>.
    c) $[Ba^{2+}]$ = 0.12 <u>M</u> and $[Cl^-]$ = 0.24 <u>M</u>.
    d) $[Ba^{2+}]$ = 0.060 <u>M</u> and $[Cl^-]$ = 0.060 <u>M</u>.
    e) $[Ba^+]$ = 0.12 <u>M</u> and $[Cl_2^-]$ = 0.12 <u>M</u>.

23. What is the molarity of the solution that results when 60.0 g NaOH is added to enough water to make 500. mL solution?

a) 1.33 M
b) 12.0 M
c) 3.00 M
d) 8.0 M
e) 1.50 M

24. What is the molarity of the solution that results when 45.0 g HCl is dissolved in enough water to make 250. mL solution?

a) 4.94 M
b) 4.50 M
c) 3.24 M
d) 1.80 M
e) 1.46 M

25. What is the concentration of Cl^- ion in 0.60 M $AlCl_3$ solution?

a) 1.8 M
b) 0.60 M
c) 0.20 M
d) 0.30 M
e) 0.10 M

26. How many grams of Na_2CO_3 (molar mass = 106.0 g/mol) are required for complete reaction with 25.0 mL of 0.155 M HNO_3?

$Na_2CO_3 + 2HNO_3 \rightarrow 2NaNO_3 + CO_2 + H_2O$

a) 0.122 g
b) 0.205 g
c) 0.410 g
d) 20.5 g
e) 205 g

27. What volume of 0.150 M NaOH is needed to react completely with 3.45 g iodine according to the equation:

$3\ I_2 + 6\ NaOH \rightarrow 5\ NaI + NaIO_3 + 3\ H_2O$

a) 181 mL
b) 45.3 mL
c) 4.08 mL
d) 2.04 mL
e) 1.02 mL

28. What is the concentration of an NaOH solution if it takes 16.25 mL of a 0.100 M HCl solution to titrate 25.00 mL of the NaOH solution?

a) 0.0165 M
b) 0.151 M
c) 0.0650 M
d) 0.100 M
e) 0.413 M

29. A 4.00 M solution of H_3PO_4 will contain ___g of H_3PO_4 in 0.250 L of solution.

a) 196 g
b) 98.0 g
c) 49.0 g
d) 24.0 g
e) 12.0 g