Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hour: \_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_

# AP Chemistry: *4HW*

***Directions: Complete the following problems.***

Determine the aqueous solubility of each substance; then write **soluble** or **insoluble**, accordingly.

1A. aluminum nitrate 1B. zinc chloride

magnesium chloride lead(II) nitrate

rubidium sulfate lead(II) sulfate

nickel(II) hydroxide sodium iodide

lead(II) sulfide cobalt(III) sulfide

magnesium hydroxide chromium(III) hydroxide

iron(III) phosphate ammonium carbonate

If a precipitate is formed when the following solutions are mixed, write its formula. Otherwise, write “none.”

2A. iron(II) sulfate + potassium chloride 2B. lead(II) nitrate + copper(II) sulfate

aluminum nitrate + barium hydroxide nickel(II) nitrate + calcium chloride

calcium chloride + sodium sulfate potassium carbonate + magnesium iodide

potassium sulfide + nickel(II) nitrate sodium chromate + aluminum bromide

3. For the reactions in Q2, write a balanced net ionic equation for each precipitate reaction.

You need to produce the following precipitates. Write the formulas of any two compounds that could react in solution to do so. Then write the balanced net ionic equation for the reaction.

4A. iron(III) hydroxide 4B. lead(II) iodide

Hg2Cl2 BaCrO4

Write balanced net ionic equations for the reactions that occur when the given aqueous solutions are mixed. If no reaction occurs, write “none.”

5A. ammonium sulfate and barium nitrate 5B. chromium(III) chloride and sodium hydroxide

copper(II) chloride and sodium hydroxide silver nitrate and ammonium carbonate

lead(II) nitrate and sodium chloride strontium nitrate and potassium iodide

sodium bromide and rubidium chloride copper(II) sulfate and mercury(I) nitrate

Write balanced net ionic equations for each of the following acid-base reactions.

6A. chloric acid + solid magnesium hydroxide

hydrocyanic acid + aqueous sodium hydroxide

hydrochloric acid + aqueous sodium hydroxide

6B. nitric acid + solid aluminum hydroxide

acetic acid + aqueous potassium hydroxide

aqueous calcium hydroxide + hydrochloric acid

Assign oxidation numbers for all atoms in the following species.

7A. KMnO4 7B. Fe3O4

NiO2 XeOF4

Na4Fe(OH)6 SF4

(NH4)2HPO4 CO

For each reaction, write “oxidant,” “reductant,” “IS reduced,” and “IS oxidized” under the appropriate substance.

8A. Cu(s) + 2 Ag+(aq) 🡪 2 Ag(s) + Cu2+(aq) 8B. SiCl4(l) + 2 Mg(s) 🡪 2 MgCl2(s) + Si(s)

Fe3O4(l) + 4 CO(g) 🡪 4 CO2(g) + 3 Fe(l) 2 AgNO3(aq) + Cu(s) 🡪 Cu(NO3)2(aq) + 2 Ag(s)

9A. Find the molarity of 750. mL of solution that contains 218 mg of sodium dichromate.

9B. A 1.083-g sample of copper is oxidized into copper(II) ions when it is placed in a small amount of concentrated nitric acid. If the resulting solution is diluted to 500. mL, find the molarity of Cu2+ ion.

10A. Find the molarity of all ions present when 0.0200 mol of lithium phosphate are in 50.0 mL of solution.

ANSWERS: 9A. 1.11 x 10–3 M 9B. 0.0341 M 10A. 1.20 M Li+; 0.400 M PO43–

10B. Find the molarity of all ions present when 218 g of ammonium carbonate are in 1.25 L of solution.

11A. A solution contains 12.7 g of ammonium sulfate in a volume of 50.0 mL. A 10.00-mL sample of this solution is added to 50.00 mL of water. Find the concentration of each ion in the resulting solution.

11B. Dianabol is an anabolic steroid having the molecular formula C20H28O2. A solution is prepared by dissolved 10.0 mg of dianabol in enough water to give a volume of 250.0 mL. A 100.0-L aliquot of this solution is then diluted to a volume of 100.0 mL. What is the concentration of the resulting solution?

12A. What is the maximum mass of aluminum hydroxide that can be produced when 60.0 mL of 0.280 M aluminum nitrate solution is mixed with 300.0 mL of 0.120 M sodium hydroxide solution?

12B. What mass of precipitate can be produced when 120.0 mL of 0.130 M barium chloride and 160.0 mL of 0.140 M iron(III) sulfate are mixed?

ANSWERS: 10B. 3.63 M ammomiun ion; 11A. 0.641 M ammomiun ion; 11B. 1.33 x 10–7 M 12B. 3.64 g

1.82 M carbonate ion 0.320 M sulfate ion 12A. 0.936 g

13A. A 0.582-g sample of “M2SO4” was dissolved in water and treated with excess barium chloride solution. This resulted in the precipitation of all sulfate ions as barium sulfate. When the precipitate was collected and dried, it weighed 0.779 g. Determine the atomic weight of “M” and state which element it is.

13B. Consider a 1.85-g mixture of sodium chloride and sodium nitrate powders. After adding 100.0 mL of water and an excess of 0.500 M silver nitrate solution, the white solid produced is collected and dried. The solid’s weight is 0.643 g. Find the percent of sodium chloride in the original mixture.

What volume of each of the following acids will react completely with 70.00 mL of 0.250 M sodium hydroxide?

14A. i. 0.200 M acetic acid

ii. 0.150 M sulfuric acid

What volume of each of the following bases will react completely with 65.00 mL of 0.400 M hydrochloric acid?

14B. i. 0.250 M potassium hydroxide

ii. 0.100 M barium hydroxide

ANSWERS: 13A. atomic weight = 39.1 g; K 14Ai. 87.5 mL 14Bi. 104 mL

13B. 14.2% 14Aii. 58.3 mL 14Bii. 130. mL

# Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hour: \_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_

# AP Chemistry: *Writing “Proper” Equations 1*

Write balanced equations for each of the following. Follow the rules below, exactly as stated. You NEED NOT put the phase after each substance.

**A. “Know thy solubility rules.”**

**B. For solids, liquids, and gases, write neutral formulas.**

**C. For “strongs” (acids, bases, or soluble salts in solution) write ions.**

**D. For “weaks” (acids, bases, or insoluble salts in solution), write neutral formulas.**

**E. NEVER write spectator ions.**

1. Zinc pellets react with hydrochloric acid to yield aqueous zinc chloride and hydrogen gas.

2. Aqueous strontium hydroxide reacts with hydrobromic acid to yield soluble strontium bromide and water.

3. Calcium hydroxide reacts in solution with phosphoric acid to yield water and a calcium phosphate precipitate.

4. Aluminum hydroxide powder reacts with hydrochloric acid to yield soluble aluminum chloride and water.

5. Hydrochloric acid reacts in solution with silver nitrate to produce nitric acid and a silver chloride precipitate.

6. Liquid phosphorus pentachloride and water react to form phosphoric acid and hydrogen chloride gas.

7. The combustion of solid molybdenum(IV) sulfide yields solid molybdenum(VI) oxide and sulfur dioxide gas.

8. Solid silicon dioxide reacts with carbon shavings to yield silicon and carbon monoxide.

9. In a gaseous reaction, ammonia reacts with oxygen to yield nitrogen monoxide and water vapor.

10. Solid sodium bicarbonate decomposes into solid sodium carbonate, water vapor, and carbon dioxide.

11. When burned in air, the disaccharide sucrose (C12H22O11) yields water vapor and carbon dioxide.

12. Solid europium reacts with gaseous hydrogen fluoride to yield solid europium(III) fluoride and hydrogen gas.

13. Solid chromium and solid sulfur react to yield solid chromium(VI) sulfide.

14. Solid silicon tetrachloride reacts with magnesium pellets to produce silicon and magnesium chloride.

15. Solid iron(III) oxide reacts with nitric acid to yield soluble iron(III) nitrate and water.