Exam Three **CHM 203 (Dr. Mattson)** **10 October 2005**	***Academic Integrity Pledge:*** *In keeping with Creighton University's ideals and with the Academic Integrity Code adopted by the College of Arts and Sciences, I pledge that this work is my own and that I have neither given nor received inappropriate assistance in preparing it.* *Signature:*

Instructions: Show all work whenever a calculation is required! You will receive credit for <u>how</u> you worked each problem as well as for the correct answer. This exam is worth 50 points. BOX YOUR ANSWERS!

1. (6 pts) Circle the compounds that would produce strong electrolytes in aqueous solution.

HF	C_2H_5N	NaCl
$HC_2H_3O_2$	HNO_3	Na_3PO_4

2. (4 pts) Will a precipitate form when the following pairs of aqueous solutions are mixed? If you answer YES, give the formula of the precipitate formed. (You do not need to give or balance the reaction.)

(a) potassium hydroxide and magnesium bromide YES NO
(b) cobalt(III) chloride and sodium phosphate YES NO
(c) ammonium iodide and silver(I) sulfate YES NO
(d) barium chloride and sodium nitrate YES NO

3. (6 pts) Write *balanced net ionic* equations for the following reactions. All compounds are in aqueous solution.

(a) acetic acid and sodium hydroxide

(b) perchloric acid and potassium hydroxide

(c) nickel(II) chloride and potassium sulfide.

4. (4 pts) What is the oxidation number of iodine in each of the following compounds?

(a) HIO_3
(b) KI
(c) KIO_4
(d) I_2

5. (5 pts) Evaluate the following statements as True or False as they pertain to the following reaction:

$$Cr_2O_7^{2-} + NO_2^- \longrightarrow Cr^{3+} + NO_3^-$$

T F $Cr_2O_7^{2-}$ is the oxidizing agent.

T F NO_2^- is the reducing agent.

T F $Cr_2O_7^{2-}$ is reduced.

T F NO_2^- is oxidized.

T F Each chromium loses three electrons.

6. (4 pts) Classify the following reactions as acid-base, oxidation-reduction, precipitation or no reaction. *There is only one of each.*

(a) A solution of potassium iodide is added to a solution of lead(II) nitrate.

acid-base	oxidation-reduction
precipitation	no reaction

(b) Aluminum metal is added to a solution of nickel(II) chloride and the green color disappears.

acid-base	oxidation-reduction
precipitation	no reaction

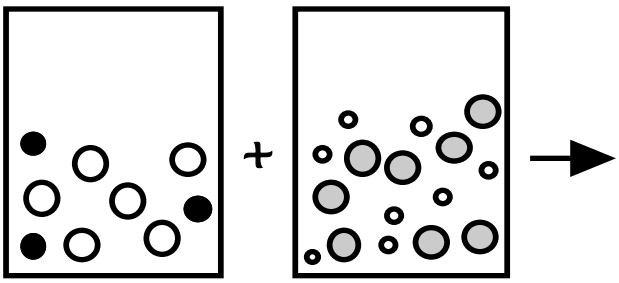
(c) Aqueous lithium hydroxide solution is added to a solution of acetic acid.

acid-base	oxidation-reduction
precipitation	no reaction

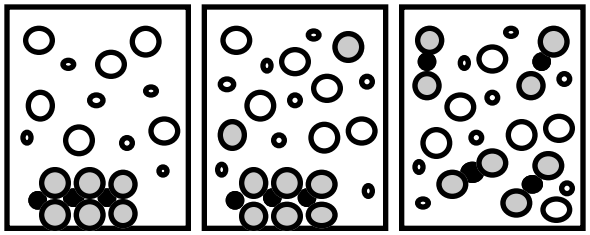
(d) Aqueous potassium carbonate and aqueous ammonium nitrate are mixed.

acid-base	oxidation-reduction
precipitation	no reaction

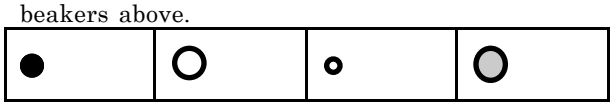
7. (5 pts) Aqueous calcium chloride, represented by the left beaker below, reacts with aqueous sodium fluoride, represented in the right beaker. The relative numbers of ions are represented by the numbers of circles. When the two solutions are mixed, a precipitate of calcium fluoride is produced.



(a) (2 pts) Which of the following beakers best illustrates the resulting solution?
Circle your choice: LEFT CENTER RIGHT



(b) (2 pt) Identify the four different ions shown in the beakers above.



(c) (1 pt) Identify the limiting reagent.

8. (3 pts) Aqueous barium nitrate reacts with aqueous potassium sulfate to form a precipitate.

(a) Write the overall reaction that takes place

(b) Write the ionic reaction that takes place

(c) Write the net ionic reaction that takes place

9. (BONUS! 1 point) Print your name here:

10. (3 pts) What is molar mass of an unknown acid, HZ, if it takes 25.19 mL of a 0.1112 M NaOH solution to titrate 0.231 g of the acid?

11. (4 pts) What volume of 0.240 M stannous nitrate is needed to completely react with 0.0040 mol potassium dichromate according to the reaction:

$$Cr_2O_7^{-2} + 3\ Sn^{+2} + 14\ H_3O^{+} \longrightarrow 2\ Cr^{+3} + 3\ Sn^{+4} + 21\ H_2O$$

12 (4 pts) What is the concentration of each of the ions in the solution that results when 130 mL 0.51 M $(NH_4)_2S$(aq) with 270 mL 0.16 M $Bi(NO_3)_3$(aq) are mixed together?

12b. (2 pts) What mass of precipitate is formed?

Your exam score (50 possible): _____

PrenHall work (0 — 5 max.): _____

Adjusted exam score (50 max.): _____

Determine your grade:
A ≥ 46.5; B+ ≥ 43.5; B ≥ 41.0;
C+ ≥ 37.5; C ≥ 34.00; D ≥ 30.00

Answers

1. NaCl, HNO_3, and Na_3PO_4

2.

(a) YES $Mg(OH)_2$

(b) YES $CoPO_4$

(c) YES AgI

(d) NO

3.

(a) $HC_2H_3O_2(aq) + OH^-(aq) \longrightarrow H_2O(l) + C_2H_3O_2^-(aq)$

(b) $H_3O^+(aq) + OH^-(aq) \longrightarrow 2\ H_2O(l)$ or

$H^+(aq) + OH^-(aq) \longrightarrow H_2O(l)$

(c) $Ni^{+2}(aq) + S^{-2}(aq) \longrightarrow NiS(s)$ (aq)

4. (a) +5, (b) –1, (c)+7, (d) 0

5. T T T T F

6. (4 pts) Classify the following reactions as acid-base, oxidation-reduction, precipitation or no reaction. *There is only one of each.*

(a) precipitation

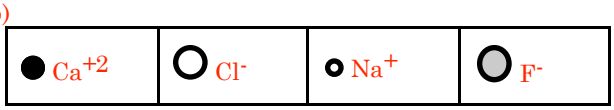
(b) oxidation-reduction

(c) acid-base

(d) no reaction

7. (a) CENTER

(b)



(c) $CaCl_2(aq)$ or $Ca^{+2}(aq)$

8.

(a) $Ba(NO_3)_2(aq) + K_2SO_4(aq) \longrightarrow BaSO_4(s) + 2\ KNO_3O(aq)$

(b) $Ba^{+2} + 2\ NO_3^-(aq) + 2\ K^+(aq) + SO_4^{-2}(aq) \longrightarrow BaSO_4(s) + 2\ K^+(aq) + 2\ NO_3^-(aq)$

(c) $Ba^{+2} + SO_4^{-2}(aq) \longrightarrow BaSO_4(s)$

10. 82.5 mL

11. 50 mL

12 $[Bi^{+3}] = 0$ M

$[S^{-2}] = 0.00375$ M

$[NH_4^+] = 0.332$ M

$[NO_3^-] = 0.324$ M

12b. 11.1 g