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| **Qualitative Analysis of Cations** | Name: |  |
| Hand-In, Chem 210L,  | Partner: |  |

1. (20 points) For each combination of reagents that reacted during the first week of the experiment, **write a balanced net-ionic equation.** Note that each equation will be worth less than 1 point but you should still take time to do the best job you can on each of the equations. See the grading rubric below for more details on the grading. Guidelines for writing reactions were described in the directions for this lab. You may also find some helpful content in your textbook if you look up precipitation reactions, acid-base reactions, and complex-ion forming reactions. A few other useful tips follow.

a. If there was **no reaction** between two solutions you mixed you **SHOULD NOT** write an equation of any kind for that combination.

b.It will be helpful for you to remember that a solution of the neutral weak base NH3 always has some NH4+(aq) and OH–(aq) ions in it. For the reactions involving NH3, if you pay attention to your observations and the guidelines for writing reactions, you should be able to deduce whether it is NH3 or one of the ions that is reacting.

**Organize your reactions clearly** in the order outlined below, which is the same order as the experimental procedure you used in lab.

**Grading Rubric for net-ionic equations**

-5pts: Correct formulas and products, but no attempt to balance

-3pts: No state labels or very few state labels

-2pts: A couple major, obvious errors

-1pt: A few minor errors or inconsistencies

For numerous major errors or being incomplete more points may be taken off.

1. All reactions involving separate metal ions and 15 M NH3.

 {Type reactions here. Here is an arrow you can copy if you want to. → Hopefully your computer recognizes the font.}

2. All reactions involving separate metal ions and CrO42–(aq).

 {Type reactions here.}

3a. All reactions involving separate metal ions and SO42–(aq).

 {Type reactions here.}

3b. All reactions involving sulfate precipitates and H+(aq) (from HNO3).

4a. All reactions involving separate metal ions and Cl–(aq).

4b. All reactions involving chloride precipitates and hot water.

4c. All reactions involving supernatants from heated chloride precipitates and CrO42–(aq).

4d. All reactions involving solids from heated chloride precipitates and 15 M NH3.

5a. All reactions involving separate metal ions and OH–(aq).

5b. All reactions involving hydroxide precipitates and 15 M NH3.

6a. Same as 5a. No need to rewrite chemical equations here.

6b. All reactions involving hydroxide precipitates and H+(aq) (from HNO3).

6c. All reactions involving product solutions from 6b and SCN–(aq).

7. (10 points) Identification of ions in unknown. Give briefly the reasons behind your conclusion.

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| **Unknown Number:** |  |  | **Ions Present:** |  |

*If you do not include your unknown number, you will earn zero points for this experiment.*