

Chemistry II - Final Project Qualitative Analysis of Unknowns

Goal

The goal of this lab is to identify the cations and anions in unknowns using qualitative analysis techniques.

Topics/Vocabulary to Include in Research (may be in lab book but MUST BE in the presentation)
qualitative analysis, cation, anion, balanced chemical reaction equation for each step of every technique completed

Background/Introduction

While quantitative techniques are important to chemists, sometimes just qualitative techniques are necessary. In a systematic qualitative analysis scheme, each substance present is separated from the other substances. A confirmatory test is then used to prove that the isolated substance is the expected one.

Guidelines

1. You will receive two “known” solutions, one containing six different cations (Al^{3+} , Zn^{2+} , Cu^{2+} , Ag^+ , Mn^{2+} , and Fe^{3+}) and one containing six different anions (Cl^- , I^- , Br^- , CO_3^{2-} , SO_4^{2-} , and NO_3^-), to test using qualitative analysis techniques.
2. You will also receive two “unknown” solutions, one containing up to seven different cations (including one that was not in the “known”), and another containing up to six different anions (all of which were in the “known”).
3. Your job is to separate and positively identify each of the cations and anions in your unknown solutions.
4. The experiment should be carried out in semi-microscale (keeping amounts reasonably small). Think 13 x 100 mm test tubes and 10 mL beakers!
5. Contamination in this lab is a constant worry. Be sure to use clean stirring rods and clean droppers every time.
6. Don't heat small test tubes directly. Use a hot water bath.
7. Be sure to decant into the appropriate waste container. If you are unsure where to decant, make your own labeled waste container(s).
8. Don't dip any pH testing paper directly into the solutions—the solutions will be contaminated. Dip the clean end of a glass stirring rod into a solution and then put the stirring rod on the pH testing paper.
9. LABEL EVERYTHING. LABEL EVERYTHING. LABEL EVERYTHING. (Mystery chemicals are scary.)
10. Only labeled, covered containers may be saved overnight.
11. Because of the unknowns, gloves are recommended at all times during this project.

Presentation Requirements (takes the place of a conclusion)

1. There should be a slide or photo for each technique performed on your unknowns.
2. Photos may only be used if they were taken by you (or another Chemistry II student or Miss Gurganus) in room 1403 during the project period (May 19-28, 2010). Diagrams and graphics may also be used.
3. There should be a photo of what each unknown looked like before testing.
4. There should be balanced chemical equations in the presentation for each confirmatory test you performed on your unknowns.
5. At least one slide should include what you are sure is in your unknown AND what

you are sure is NOT in your unknown.

6. Final slide(s) should include any problems you encountered, how you solved (or dealt with) them, any improvements/changes you would make to the project, and any additional work that still needs to be done.
7. Presentation should be very professional.
8. Maximum time limit = 10 minutes!
9. Be ready to answer questions about your presentation!

Point Values:

Daily labs - 11 points each + title page, goal = 46 points

Presentation of results = 30 points

Correct answer(s) = 10 points

Total point value of project = 86 points

- counts as a lab/project for 4th quarter AND as 50% of your final exam grade

Required parts of daily labs: title page (only for first lab), goal (only for first lab), materials (what you plan to use), hazards (of the test chemicals you plan to use, plus an unknown), procedure (of the tests you plan to do), pre-lab signature, data (of the tests you get done), and clean-up and partner signatures

NOT required: abstract, daily research (but highly recommended), written conclusion (just needed in presentation)

As with any chemistry lab or project, your lab reports should be written **BY YOURSELF, IN YOUR OWN WORDS**. Partners' labs need not be the same or similar. Partners do not need to reach the same conclusion/answer. Partners don't even need to work together! Lab reports will be graded individually. Only the computer-based slideshow/presentation will receive the same grade for both partners.

Unknowns will not be remade/replaced for any reason. Be careful and conservative with your unknown!

Daily Schedule:

Wednesday	May 19	Partners revealed, project explained, day to write and plan pre-labs
Thursday	May 20	Project Lab Day #1 (ends at 10:23 am because of assembly)
Friday	May 21	Project Lab Day #2
Monday	May 24	Project Lab Day #3
Tuesday	May 25	Project Lab Day #4
Wednesday	May 26	Day in class to work on presentation
Thursday	May 27	Project Presentation Day #1
Friday	May 28	Project Presentation Day #2