

LCP

Name: _____

Partner's Name(s): _____

Lab Date: _____ Lab Instructor Name: _____

EQUILIBRIUM AND LE CHÂTELIER'S PRINCIPLE LAB NOTEBOOK PAGES

All purpose, procedure(s), and data/observations must be recorded in the lab notebook in pen with permanent, waterproof ink (black or blue). Pencils, markers, highlighters, and correction fluid (white-out) are not permitted. No information can be recorded elsewhere and transferred after leaving the lab. Lab notebooks can be digital or paper; you may write directly on the lab notebook pages in your lab manual or download a digital copy onto your electronic device and then write in it. Refer to the Guide for Success in the General Chemistry Laboratory section in the front of this lab manual for more detailed instructions.

- ⦿ **Before Lab:** Make sure to complete the Purpose and Procedure sections in your lab notebook pages.
- ⦿ **After Lab:** Upload your notebook pages to the appropriate Carmen assignment within 48 hours after the start time of your in-person lab session. If you used the notebook pages in your paper copy of your lab manual, you should scan or take photos of the pages. Do not remove them from your lab manual. Refer to the LCP Notebook upload assignment in Carmen for more detailed instructions.

PURPOSE _____

Describe the what, why, and how of the experiment in bullet points or a few sentences. Consult the Expected Learning Outcomes and the procedure for the experiment to develop the purpose.

PROCEDURE CITATION _____

Chemistry 1220: General Chemistry Laboratory Manual, Fall 2025–Summer 2026.; Weaver, T. A., Opoku-Agyeman, B., Fontes N. Da Silva, C., Welch, A. N., Stern, J. E., Wroblewski, R. A., Walter, C., van Helmond, A. Eds.; Van-Griner Learning: Cincinnati, OH; pp. 97–108.

PROCEDURE

PART A. OBSERVATION OF SHIFTS IN THE AQUEOUS ANTIMONY TRICHLORIDE SYSTEM

Write a summary or step-by-step procedure for this part of the experiment in the space below.

PART B. ANALYSIS OF THE COPPER(II) CHLORIDE SYSTEM

Before Lab: Write a *step-by-step* procedure you plan to use. Be as detailed as possible.

During Lab: Note any updates/adjustments you made to your procedure before you leave the lab.

CLEAN UP AND WASTE DISPOSAL

All solutions must be collected in a personal waste beaker at your desk. Add the contents to the class Chemical Waste beaker in Hood B, and fill out the Chemical Waste Disposal Form. Dispose of used 25-mL test tubes and Pasteur pipets in the Orange Glass Waste bucket. After cleaning up, wipe down your work area with 70% ethanol spray and a paper towel. Wash your hands thoroughly after completing this experiment.

DATA AND OBSERVATIONS

PART A. OBSERVATION OF SHIFTS IN THE AQUEOUS ANTIMONY TRICHLORIDE SYSTEM

VOLUMES	OBSERVATION	MOLARITY OF SbCl_3^*	MOLARITY OF H^+ , Cl^-*
None			
+ 4.0 mL (4.0 mL H_2O total)			
+ 4.0 mL (8.0 mL H_2O total)			
+ 4.0 mL (12.0 mL H_2O total)			
+ 4.0 mL (16.0 mL H_2O total)			
+2.0 mL 6.0 M HCl			

What errors in concentration are introduced when only dilution is taken into account for the above calculations?

Are concentrations of SbCl_3 , H^+ , and Cl^- actually larger or smaller than calculated?

Initial buret reading (mL) _____

Final buret reading (mL) _____

Volume of water added (mL)* _____

Final volume of solution (mL)* _____

Concentration of SbCl_3 (M)* _____

Concentration of H^+ and Cl^- (M)* _____

Remember, HCl fully ionizes into H^+ and Cl^- in water.

Equilibrium constant, K^* _____

PART B. ANALYSIS OF THE COPPER(II) CHLORIDE SYSTEM

SAMPLE	OBSERVATIONS	IDENTITY OF SAMPLE (0.15 M CuCl_2 IN H_2O OR 0.15 M CuCl_2 IN 12 M HCl)
X		
Y		

Proposed Net Ionic Equation:



REAGENT	PREDICTED DIRECTION OF SHIFT	EXPLANATION OF PREDICTED SHIFT
Saturated NaCl		
0.1 M $\text{Pb}(\text{NO}_3)_2$		
15% K_2CO_3		
Zinc shot		
Deionized water		

Predictions should not be changed after completing a test nor after leaving lab. Incorrect predictions will not be penalized.

OBSERVATIONS OF TEST SOLUTION (0.15 M CuCl_2 IN 2.5 M NaCl)

CHEMICAL TEST	REAGENT COMBINED WITH 0.15 M CuCl_2 IN 2.5 M NaCl	INITIAL OBSERVATIONS AFTER ADDING REAGENT	OBSERVATIONS AFTER FIVE MINUTES
1			
2			
3			

THERMODYNAMIC TEST	TEMPERATURE OF WATER BATH ($^{\circ}\text{C}$)	OBSERVATIONS AFTER FIVE MINUTES
1		
2		
3		

* Indicates value is calculated.

