

Pre-lab: Experiment 9: Single Replacement Reactions

Format & Clarity of the Report: See lab report checklist. You are graded on how you format the lab and record your data, not just data collection..

Before class starts: Read the lab for the week carefully before you start writing your pre-lab. The purpose, introduction, and procedure should be neatly written in your lab book before class starts. Keep the introduction and the purpose separate. Prelab questions need to be correctly answered.

Spacing: You will probably use 2 pages for your purpose and procedure (**DO NOT CRAM THE PROCEDURE ONTO 1 PAGE**), 1-2 pages for the data table. If you allot an appropriate amount of space, you will not have to mix labs together if you have to do more than one in a week. You will lose points for poorly formatted labs. The rest of the lab is turned in on a report sheet.

Purpose: Address the following in your purpose: At the end of this lab, what are you expected to accomplish? The first page of the introduction in the lab manual addresses this issue.

Introduction: **DO NOT WRITE AN INTRODUCTION HERE.**

Pre-lab questions: NONE

Procedure: This lab requires forethought and a little planning. Here are some suggestions: you are going to be working with toxic metals. Get a beaker for slops; a 250 or 400-mL beaker should do nicely.

CHANGES IN THE PROCEDURE:

READ THIS, IT IS IMPORTANT: We **WILL NOT** be using silver metal for the tests. In addition to the listed solutions, you will test a potassium chloride solution against the metals. You can still infer information about silver metal and potassium metal from the reactions of the ions.

FOR EACH PART: After filling each test tube with the appropriate metal and solution, put the test tubes in a hot water bath for 2-3 minutes. Observe the results. Did you see more reaction occur?

- After lab is through, wash your hands. Silver nitrate stains the skin, so be careful handling it. Put any of the solid metals in the appropriate waste beakers in the hood. All waste solutions will eventually go in the inorganic waste bottles.
- Clean your test tubes carefully between each solution. You do not want any residual solution from the previous reaction to interfere with your new set of reactions.

Qualitative Observations/Data Collection: Your observations should be written in the observation section of your lab report. You should record the appearance of each metal strip before you do any reactions on them, the appearance of the solutions before the reactions, what happens in each of the reactions, [Did the reactions take a long time? Did you have to heat the test tube?] Report any errors or difficulties that came up when carrying out the procedure (not waiting long enough for a reaction to take place.), This section will be looked at the most carefully, since this is an observation and deduction lab (some might say induction).

DON'T USE BALANCED EQUATIONS FOR OBSERVATIONS. THEY ARE CONCLUSIONS.

There are a lot of observations. So, what is an observation?

Good observations: The solution in the test tube bubbled. A brown ppt formed in the test tube. The solution was clear blue and turned cloudy upon addition of NaOH.

Bad observations: green; rxn occurred; test tube bubbled; clear; white; $\text{KNO}_3 + \text{AgCl}$ (a conclusion!).

Really bad observations: writing down nothing at all.

STOP HERE! The rest of the lab is transferred into the data table provided. You don't have to put the data table in your lab book.

Data Tables: Transfer your observations from the observation section and **NEATLY** record your observations in your lab book (see Exp. 8 for example of data table), since you are transferring the information at home.

Calculations:. No calculations for this experiment.

Graph:. No graph.

Results Tables: Results Table –Use the report sheet results table.: Write the net ionic equation for each reaction that occurred. Note the observations that lead you to the conclusion that a reaction had occurred.

It is good practice to copy the result table into your lab book-this is not a requirement for the lab.

Questions: See lab manual and report sheet.

Attachments and Other Information: Use the results table to organize your observations and draw conclusions about the order of reactivity. Your observations must support the order that you have chosen. You can use the activity series in the book to discuss why you think you might not have the correct order.

Results Table 1: Rating the Activity of the Metals in the Experiment and the Unknown-Note
Write the net ionic equation for each reaction that occurred in this experiment. (15 points, 1 point each). You can do the molecular and ionic equations, but they will not be graded.

Metal + Cation	Net ionic equation (with phases)
$\text{Cu}_{(s)} + \text{Au}^{3+}_{(aq)}$	$\text{Cu}_{(s)} + \text{Au}^{3+}_{(aq)} \rightarrow \text{Cu}^{2+}_{(aq)} + \text{Au}_{(s)}$

Results Table 2: Rating the Activity of the Metals in the Experiment and the Unknown

Set 1	Tube 1	Tube 2	Tube 3	Tube 4	Tube 5
Greater activity	$\text{Cu}_{(s)}$	$\text{Pb}_{(s)}$	$\text{Mg}_{(s)}$	$\text{Zn}_{(s)}$	NR cation and anion are same
Lesser activity	$\text{Au}_{(s)}$	$\text{Au}_{(s)}$	$\text{Au}_{(s)}$	$\text{Au}_{(s)}$	NR cation and anion are same

Arrange unknown metal, Mg and Zn in order of their activities, listing the most active first.

(1) _____
(2) _____
(3) _____

etc

Questions

See the report sheet

READY TO TURN IN THIS LAB?

You should have the observation section filled out in your lab book. Copy your results neatly to the handout provided on the web site. Answer the questions on the handout. Turn in the copy sheet

from your lab book (could be yellow, could be white-depends on your book), the results table, and the answers to the questions (all on report sheet). Make sure your name is on everything.