

Report Guidelines for Assignment 4 (Titrations and Indicators)

Pre-lab work is due at the beginning of the lab section. Refer to the laboratory syllabus for the due dates of the post-lab report. Pre-lab and post-lab reports **MUST** be written inside your lab notebook (with the exception of graphs.)

The REVISED PROCEDURE for this experiment is supplemented as a handout. Make sure you read the revised procedure before writing your reports.

(I) On-line Technique Videos & Resources For This Experiment

Click on the title below to download the video (require [Real Player](#))

- (1) [Laboratory Safety](#) (this video was shown on the first day of the lab)
- (2) [Use of a Buret](#)

If you have trouble downloading the videos, go to the following Web site and click on the appropriate title to download the video.

<http://oid.ucla.edu/Webcast/Chemistry/>

[Guides for Writing Lab Reports](#)

[Theory on pH Meter](#)

[Theory of Acid-Base Indicators](#)

[Various concentration units \(including Normality and Molarity\)](#)

(II) Pre-lab Report Guideline

(I) Introduction

(II) Procedure in Flowchart Format (*use the REVISED PROCEDURES*)

(III) Reference (i.e. complete reference of the experiment including title of the lab manual, author, edition and page number of the experiment in the manual etc.) Include any changes to the procedure that you know you will make.

Report Guidelines for Assignment 4 (Titrations and Indicators)**(II) Pre-lab Report Guideline (Continued)**

(IV) MSDS information (*refer to the MSDS handout for details*)

The following chemicals will require you to use the MSDS database on the Web:

Sulfuric Acid (0.2N or 0.1M)

Note: In MSDS, select the site that gives you the MSDS information closest to the concentration listed above for each individual chemical. You may have to convert the concentration units on MSDS before you decide which site to use since sometimes the unit may be reported as w/v% in MSDS.

You should record the following MSDS information in your notebook for the chemicals listed above.

(Printouts directly from the Web pages will NOT be accepted!!)

- (a) Product Name
- (b) Chemical Formula
- (c) Formula Weight
- (d) Melting Point; Boiling Point and Density
- (e) Health Hazard Data (**summarize in your own words**)
- (f) Spill and Disposal procedures (**summarize in your own words**)

(V) Complete study questions #1 & #2 (see bottom of page 58 & 59):
Show ALL your work and reasoning.

Read pages 56-58 BEFORE you start working on the study questions.

NOTE: For question 2(b), you may assume that BOTH protons dissociate completely.

**Useful mathematical relationship for pH and pOH:
 $\text{pH} = -\log[\text{H}^+]$ and $\text{pOH} = -\log[\text{OH}^-]$. $\text{pH} + \text{pOH} = 14$.**

(VI) Set up BLANK data table

READ the procedure and set up the necessary data tables for the experiment.

Note: Start a NEW page in your notebook for this section. The previous material will be turned in at the beginning of the period; this page will be turned in at the end of the lab period

Report Guideline for Assignment 4 (Titrations and Indicators)**Post-lab MUST be written inside your lab notebook****Post-lab Report - This is a GROUP report****(I) Data, Observations and Responsibility**

If you are working with another student for this experiment, write the name of each of the group members for this experiment. Write out the responsibility of each group member when writing this report and during the experiment

(i) Organize your data for **EACH** of the indicators in a table format (i.e. recopy the data that your group collected during the lab period into your post-lab report).

For each table for an indicator, set up the following three columns:

pH, buret volume (or volume of titrant added), color of the solution

(II) Data Analysis & Discussions

(ii) Calculate the normality (normal concentration) of the sulfuric acid for **EACH** indicator at the *end point* of the titration. **Show ALL your work and reasoning.**

Note: At the equivalence point, the number of equivalents of acid equal the number of equivalents of base (please also read the example on page 57 of the manual):

$$N_A \times V_A = N_B \times V_B$$

where A stands for acid and B stands for base.

N_A = Concentration of the acid in normality; N_B = Concentration of the base in normality

V_A = Volume of the acid required to titrate to the end point

N_B = Volume of base use in titration

(iii) Assuming that the correct indicator for this experiment is bromocresol green, calculate the % deviation (or % difference) for the concentration of the sulfuric acid for the other two indicators. Show ALL your work. *Note: % deviation is NOT the same as % RAD or % RSD.*