# INTRODUCTION

The lab practical is an exam to test your lab knowledge and skills gained during the semester. It will be a series of stations set up around the room that you will rotate through as directed by your instructor. Although any topic covered in lab during the semester may be covered on the practical, the main topics that you should review from each experiment are covered on the following pages of this document. Some additional information about how the practical will be done is covered in the list below.

1. Your instructor will assign you a specific start time within your normal lab period. (The practical only takes about an hour.)
2. When instructed, you will enter the room, set aside your backpack, etc., put on your lab coat, and goggles, and put your pencil and calculator in your pocket.
3. You will then be assigned to go to your starting station and wait for further instructions. (From this point on, all normal exam rules apply (no talking, no cell phones, etc.).
4. At this point, your instructor will explain the rules, which will include at least the following.
   1. When you receive your response sheet, note the version. (A, B, or C)
   2. At each station, be sure to do the instructions corresponding to your version.
   3. The session will be broken down into 4 minute segments timed by your instructor. When each 4 minute period ends, everyone will rotate one station forward for the next period.
   4. At each station, be sure to record your response in the box corresponding to the number of the station. (For example, if you are at station 4, record your response in the box for station 4.)

# experiments

## ~~Exp 2a – Electrons in Atoms~~

* ~~Making wavelength of light measurements with a spectroscope.~~
* ~~Calculating emission wavelengths from the hydrogen atom using the Rydberg equation.~~
* ~~Understand the Bohr model of the atom and how emission or absorption of light relates to electron energy levels.~~
* ~~Know the basic regions of the electromagnetic spectrum and be able to order different types of electromagnetic radiation in terms of energy, frequency, or wavelength.~~

## Exp 4a – Making Measurements

* Know how to make measurements using different measuring devices. (Including rulers, graduated cylinders, and balances.)
* Be able to calculate volume using the dimensions of a regularly shaped object (rectangular prism or cylinder).
* Be able to calculate volume of an object using the “displacement method”.
* Know how to calculate density.
* Understand what density is and what can be implied if substances have the same or if substances have different densities.
* Be able to calculate a % difference.

## Exp 5a – Empirical Formula

* Understand empirical and molecular formulas of chemical compounds.
* Be able to calculate the empirical formula of a compound from experimental mass data as recorded in this experiment.
* Know names of all of the equipment used in this experiment and how they are used. (Bunsen burner, bench stand, crucible, iron ring, clay triangle, and crucible tongs.)
* Be able to calculate mass percentages of elements in a compound from experimental mass data or from a chemical formula.

## Exp 6a

* Be able to draw Lewis Structures of molecular compounds.

## Exp 7a - Calorimetry

* Know how and when it is appropriate to use the equation,
* Know how and when it is appropriate to use the equation,
* Understand the purpose of, and the basic parts of a “coffee cup calorimeter”.
* Know how to read a thermometer.
* Know how to make the appropriate measurements and calculate the change in temperature of a chemical reaction.
* Be able to calculate the heat absorbed or released by a chemical reaction from experimental data.
* Be able to calculate the heat absorbed or released by the surroundings from experimental data.
* Know how to interpret observations and data to determine whether a chemical reaction is exothermic or endothermic.
* Given experimental data, and the necessary mathematical equation, be able to calculate the specific heat capacity of a substance from experimental data (part 3 of the experiment).

## Exp 9a – NaCl Standard Curve

* Be able to use volumetric pipets and volumetric flasks and know what types of measurements would be appropriate to make with each device.
* Be able to calculate the molarity of a solution made from solid solute (e.g. NaCl) dissolved in water.
* Be able calculate the molarity of a solution diluted from a more concentrated solution.
* Know how to make the necessary measurements to calculate density of a solution.
* Be able to calculate the density of a solution from experimental data.
* Use a calibration curve, given equation of trend line, to calculate molarity of a solute from the density of the solution.

## Exp 10a – Types of Reactions

* Know the different types of reactions (especially from “Scheme 2”).
* Be able to determine the type of a chemical reaction from either experimental observations or predict from the formulas of the reactants.
* Be able to complete the chemical equation for a reaction between known reactants including balancing the equation and states of reactants and products.

## ~~Exp 10b – Redox Reactions~~

* ~~Know the different types of reactions (especially from “Scheme 2”).~~
* ~~Be able to determine the type of a chemical reaction from either experimental observations or predict from the formulas of the reactants.~~
* ~~Be able to complete the chemical equation for a reaction between known reactants including balancing the equation and states of reactants and products.~~
* ~~Be able to determine oxidation states of elements in a compound and define what was oxidized, reduced, the oxidizing agent, or the reducing agent in a chemical reaction.~~
* ~~Be able to perform stoichiometric calculations and determine limiting reactants, excess reactants, theoretical yield, and % yield.~~

## Exp 11a – Synthesis of Alum

* Be familiar with all equipment used in this experiment (beaker, watch glass, etc.)
  + Specifically- be able to recognize and describe the purpose of each part of the vacuum filtration apparatus
* Be able to use a balance
* Know how to calculate the molar mass of a hydrate.
* Be able to calculate theoretical for the reaction carried out in this experiment.
* Be able to calculate percent yield if given an actual yield.
* Know how to determine if a percent yield is reasonable or not.

## Exp 11b – Stoichiometric Gas Production

* Know how to correctly read the temperature from a thermometer.
* Know how to look up vapor pressure of water. (and know what it is.)
* Be able to use Dalton’s Law of Partial Pressures to calculate the pressure of a gas collected above water.
* Know how to use the Ideal Gas Law.
* Know the parts of the gas collection apparatus and what they are used for.
* Be able to read the volume of gas collected in an Eudiometer (gas collection tube).
* Be able to perform the gas stoichiometry calculations necessary in this experiment.

## Exp 12a – pH of Household Items

* Understand the concept of pH.
* Understand how red cabbage juice changes with pH. (Know the basic color changes.)
* Given one of pH, pOH, [H3O+], or [OH-], be able to calculate the other three.
* ~~Given a mass of strong acid or base (or both) added to a known solution volume, be able to calculate the resulting pH of the solution.~~

## Exp 12c – Determination of acetic acid in vinegar

* Be familiar with all equipment used in a titration apparatus (Erlenmeyer flasks, buret, etc.)
* Understand the meaning of the terms, titration, titrant, standardization, and determination as they are used in the context of a titration experiment.
* Know how to calculate the molar mass of a hydrate.
* Know how to use and read the volume on a buret.
* Know how to determine the volume of titrant (NaOH) used in a titration from experimental data.
* Be able to perform the solution stoichiometry calculations for the determination of citric acid Molarity in soda.

Chem 3A Equipment Study Guide

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| --- | --- | --- | --- |
| 1.png |  |  |  |
| Thermometer | Test Tube | Beaker | Watch Glass |
|  |  |  | http://www.alphalabs.co.uk/system/cache/cms_site_products_images_1436-1-1376_800_800_0.png |
| Graduated Cylinder | Erlenmeyer Flask | Volumetric Flask | Transfer Pipet |
|  | http://stores.intuitwebsites.com/beaglewebstore/catalog/3614.jpg |  |  |
| Volumetric Pipet | Pipet Bulb | Buret | Buret Clamp |
|  |  |  |  |
| Bunsen Burner | Funnel | Wash Bottle | Crucible Tongs |
|  |  |  |  |
| Crucible w/ Lid | Ring Stand w/ Rings | Utility Clamp | Clamp Holder |