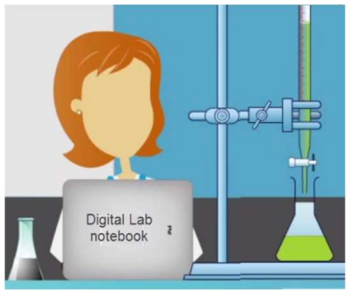
The Lab Notebook

"You are here to learn the subtle science and exact art of potion-making[1]…."

Lab notebook requirements are evolving with most colleges switching from the traditional lab notebook and notebook procedures to new models for lab reporting. When you take your college lab courses, they will provide you with the standards that you will follow.

This set of lab notebook rules is based on traditional protocols. Even though the "details" of lab notebooks are changing, the ethics and reasons for recording labwork have not changed.

You will be performing labs, recording them in your Lab Data Notebook, and answering questions about the investigations.

Equipment you will need:	
Lab Data Notebook and a pen	Lab Experiment Instructions Binder
	
You can purchase lab notebooks that are waterproof, have beautiful leather covers, and have carbonless duplicate pages, but for our class all you will need is a simple composition notebook that is bound with 100 pages. I recommend a notebook that is graph ruled, or college ruled rather than wide line ruled.	Use a ringed binder to hold the lab instruction sheets including this set of instrucitons.
Electronic Lab Notebooks (ELN) While a few colleges still use formal, hardcopy lab notebooks described in this document, most are switching over to digital notebooks. Take a look at the site of one of the companies promoting digital lab notebooks. labarchives Chance Favors the Organized Lab https://www.labarchives.com/	

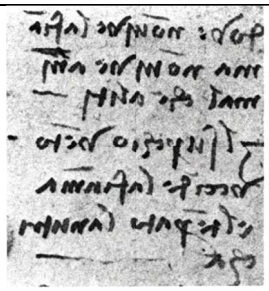
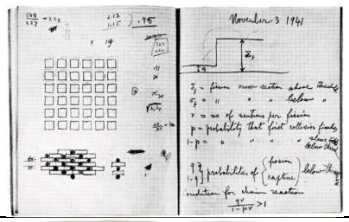
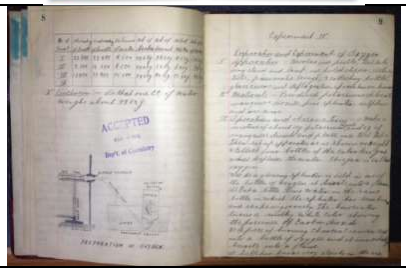
[1] Professor Snape to his potions class at Hogwarts School of Witchcraft and Wizardry
Harry Potter and the Philosophers Stone J. K. Rowling
The full quote is

> "You are here to learn the subtle science and exact art of potion-making. As there is little foolish wand-waving here, many of you will hardly believe this is magic. I don't expect you will really understand the beauty of the softly simmering cauldron with its shimmering fumes, the delicate power of liquids that creep through human veins, bewitching the mind, ensnaring the senses. . . I can teach you how to bottle fame, brew glory, even stopper death - if you aren't as big a bunch of dunderheads as I usually have to teach."

Fortunately, my students are not dunderheads.

Traditionally the laboratory data notebook has been the enduring record of laboratory work and a key part of a lab experiment.

Lab notebooks have become important historical documents. Here are some examples:

One of Leonardo da Vinci's lab notebooks was purchased by Bill Gates for thirty million dollars and is now valued at 60 million dollars making it the most valuable book ever sold.. This page from another da Vinci lab notebook, the *Codex Atlanticus*, describes a personal report of experiments on the gases involved in burning by Leonardo da Vinci, dove noujve lafia ma no uj ve anj mal che alitij- Il sup-chio veto vccide lafiama el tepato lanutri cha Where flame cannot live, no animal that draws breath can live. Excess of wind puts out flame, moderate wind nourishes it.	 *Il Coice Atlantico*, 270 r.a. –Biblioteca Ambrosiana, Milan
This shows two pages Enrico Fermi's laboratory notebook written November 3, 1941. Fermi and his team of physicists at Columbia University worked on a preliminary design for a nuclear reactor. Fermi devised a lattice structure of graphite and uranium oxide for an "exponential" pile and calculated the requirements for a self-sustaining chain reaction.	
On a lighter note, Maxfield Parrish, Haverford College, class of 1892, was a well-known American artist and illustrator. As a 19-year-old chemistry student in Haverford College chemistry, Maxfield had to keep a college lab notebook. He illustrated his lab notebook with his own fanciful drawings of elves operating Bunsen burners, pouring liquids from test tubes and performing other related tasks. His lab notebook is in the Haverford College Museum.	 
From my personal library, Page 9 of a student's lab notebook from 1916. Not quite a 30 million-dollar, 72-page *Codex* that Bill Gates owns, but it is one of the most valued books in my library.	

Aside from the possibility of your lab notebook being a valuable historic document, there is only a slight chance that if you apply for AP Chemistry credit in a college class, the instructor may ask to see your chemistry lab notebook to receive credit. So, you may want to keep your lab notebook until you take your first college chemistry class.

There is a great deal of variety in college requirements for lab notebooks. Many colleges are abandoning formal lab notebooks and switching to digital notes or even just answering questions based on lab data.
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The standards that I describe are based on the strictest requirements for a paper notebook. Also, if you are showing up with a lab notebook like this, it will really impress your college lab instructor.

Lab Data Notebook Standards (sequential record of labs done without the possibility of deletion or erasure)

1. Notebook pages must be serially numbered in the upper right corner. When done correctly, a 100-sheet notebook will end at page 100.

2. The notebook pages must not be intentionally inserted or removed or ripped out. Any such action opens the possibility that someone will question the authenticity of your data. The numbering of the pages assures that no data was removed. Electronic lab notebooks (ELN's) also have requirements that prevent any deletion of data.

Maintaining Your Lab Data Notebook

1. **You should never work in the lab without your Lab Data Notebook.** As you carry out an experiment, write down your experimental data and notes. While tempting, it is NOT acceptable to write your data and observations on loose pieces of paper and later transcribe the information into your Lab Data Notebook. The notebook must accompany you to the lab and must be open and in constant use as you work.

2. **All writing in the notebook must be done in permanent ink.** A ballpoint pen with permanent blue or black ink is recommended. Do NOT use a pencil. Pencil entries may be erased and altered. Entries (even recording errors) in a lab notebook are not to be changed. Showing a lab notebook written in pencil to a college review board could probably result in a rejection.

3. **If you make an error in writing a word, recording data, or doing a calculation, cross out the error with a single line**. Then write the correct word or number immediately above or next to the incorrect entry. Under no circumstances is it permissible to use whiteout or erase Lab Data Notebook entries. It is important for someone reading the notebook to be able to assess the nature of the error.

4. **It is essential to keep complete records of ALL experiments, whether "successful" or "unsuccessful."** Often an experiment judged "unsuccessful" later proves to have been "successful" in an unanticipated way. Your experiment is what really happens.

5. **Do not worry about making perfect entries of your observations and data.** It is expected that a Lab Data Notebook will have cross outs. Spills that victimize the notebook are inevitable. Using the notebook properly and at the same time keeping it perfectly spotless and neat are mutually exclusive. Real lab notebooks are never perfect.

"The student should realize that good note keeping is an acquired skill that can be of tremendous benefit in any career. If this skill is well developed while in school, note keeping will become a matter of habit rather than a chore. *Writing good notes requires discipline and practice.* It is a skill that does not come easily to most people."[2]

Lab Grades

Your lab grade will be based on the WebAssignments.

I will not grade your lab notebook. The book is your personal record of your work and proof that you performed labs.

To start your Lab Data Notebook

Using your ink pen, number each sheet in your notebook from 1 to 100 including the front page.

INSIDE COVER (If you cannot use the inside cover because the inside cover has material printed on it, you can use Page 1 instead). Your table of contents should be easily seen at the beginning of your lab notebook.

Student Name: Your Name
Instructor: Mr. Peter Moskaluk
AP Chemistry
Lab Notebook No: 1

Table of Contents:

Page 1 Preface

Some standards have you start numbering the pages after the index while others require that every page in the notebook be numbered. The idea is that you must maintain an index so that your lab work can be easily followed.

As you complete each experiment, record the Experiment Title and Page Number in the inside cover Table of Contents.

[2] *Writing the Laboratory Notebook* by Howard M. Kanare

Although you know the purpose of your notebook, future readers will not. Imagine someone finding your lab notebook one hundred years from now (as I have for the 1916 lab notebook that I found). Tell that person what your lab notebook is about.

On page one of your notebook, write a short preface. You may use my wording or your own for the preface.

1

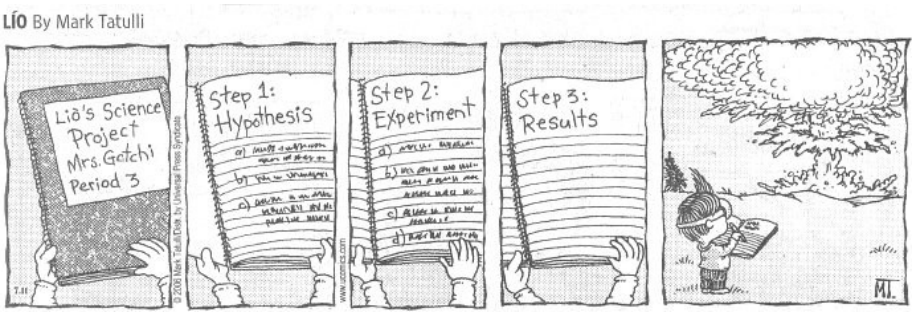
Preface *October 1, 2024* [3]

I am a student taking an online AP Chemistry course. This notebook contains my record of experiments performed for this class.

The complete list of chemicals and equipment along with the instructor's instructions for the experiments are in a separate lab binder.

The purpose of the notebook is to provide a record of experiments that I performed.
*The experiments were performed in……*a short description of the setting of your lab, including your location.

Keep the lab instructions that you get for each experiment, including these, in your lab binder. The labs are due by the end of the semester when they will be included in your cumulative grade.



[3] Do not use numbers to denote the month, use the name of the month so that there is no ambiguity as to the date and month.
e.g. 1/12/2024 could mean either January 12th or December 1st depending on the format choice of the writer.