Laboratory Notebooks

Biochemistry Boot Camp 2018
Session #9
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Overview

- What is a Lab Notebook?
- What to include in Notebook?
- How to maintain a good Notebook?
- Entry Examples

What is a Lab Notebook?

- Primary record of research
- Contains:
  - Background for experiment
  - Method used
  - Data recorded
  - Interpretation of results
- Be sure to contain enough information in your notebook that you or someone else can follow what was done and reproduce the results

What to include in Notebook?

- Table of Contents
- Title of Project and Date
- Experimental Details
  - Procedure, list of reagents used, list of instruments used, what water was used
- Print out of data
  - Gels, Graphs and Figures that support results
- Protocols and Calculations
- Conclusion

Maintenance and Ethics

- All data goes into the lab notebook
  - "Good" and "Bad" results
  - Failed or contradictory experiments
- No pages come out of the lab notebook
  - Even if there are mistakes or spills on the page
  - Don't skip pages
  - Cross out any unused parts of the page
- Correct mistakes
- Honesty is essential

*Information taken from NIH:
https://www.training.nih.gov/assets/Lab_Notebook_508_(new).pdf

Correcting Mistakes in Notebook

- Bad

~~I measured the UV absorbance at 280 nm to be 0.325, a concentration of 75.0 uM.~~

Misread the 260 value. A_{280} is 0.531, or 123 uM.

- Good

~~I measured the UV absorbance at 280 nm to be 0.325, a concentration of~~ 75.0 uM. RH 06/01/18

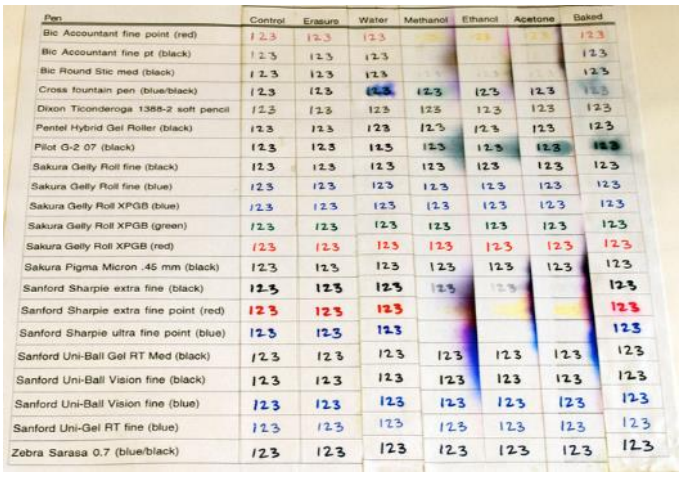
Misread the 260 value. A_{280} is 0.531, or 123 uM.

Recording the Data

- Directly into notebook in black or blue ink
  - Make sure you choose an appropriate pen to document results – many bleed when exposed to water or common solvents
- Make entries only in ruled areas of the numbered pages
- Unnumbered pages not to be used
- Attach supporting data

Pen Test

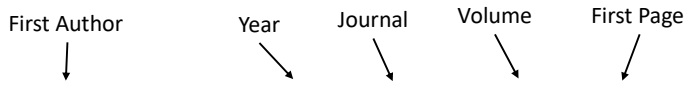
Pens Tested:
1. Control
2. Erasing
3. Water
4. Methanol
5. Ethanol
6. Acetone
7. Baking



Pen	Control	Erasure	Water	Methanol	Ethanol	Acetone	Baked
Bic Accountant fine point (red)	123	123	123				123
Bic Accountant fine pt (black)	123	123	123				123
Bic Round Stic med (black)	123	123	123				123
Cross fountain pen (blue/black)	123	123	123	123	123	123	123
Dixon Ticonderoga 1388-2 soft pencil	123	123	123	123	123	123	123
Pentel Hybrid Gel Roller (black)	123	123	123	123	123	123	123
Pilot G-2 07 (black)	123	123	123	123	123	123	123
Sakura Gelly Roll fine (black)	123	123	123	123	123	123	123
Sakura Gelly Roll fine (blue)	123	123	123	123	123	123	123
Sakura Gelly Roll XPGB (blue)	123	123	123	123	123	123	123
Sakura Gelly Roll XPGB (green)	123	123	123	123	123	123	123
Sakura Gelly Roll XPGB (red)	123	123	123	123	123	123	123
Sakura Pigma Micron .45 mm (black)	123	123	123	123	123	123	123
Sanford Sharpie extra fine (black)	123	123	123	123	123		123
Sanford Sharpie extra fine point (red)	123	123	123				123
Sanford Sharpie ultra fine point (blue)	123	123	123				123
Sanford Uni-Ball Gel RT Med (black)	123	123	123	123	123	123	123
Sanford Uni-Ball Vision fine (black)	123	123	123	123	123	123	123
Sanford Uni-Ball Vision fine (blue)	123	123	123	123	123	123	123
Sanford Uni-Gel RT fine (blue)	123	123	123	123	123	123	123
Zebra Sarasa 0.7 (blue/black)	123	123	123	123	123	123	123

Pen Test Done by Colin Purrington:
http://photography.colinpurrington.com/lab-notebook/h636c797b#h636c797b

Journal References



Smith, J. et al. (2010) Nature. 465: 302.

- Some information from the paper that pertains to your research
- Concentration of solutions, equilibrium constants, mechanisms, etc.

Calculations: Example 1

- Making 100 mL of 200 mM NaCl (1.17 g), 20 mM HEPES pH 7.3 (2 mL), 10% (w/v) Glycerol (10g)
- Making 100 mL of: 200 mM NaCl

$$\frac{100\ \cancel{mL}}{1000\ \cancel{mL}} \left| \frac{1\ \cancel{L}}{1\ \cancel{L}} \right| \frac{0.2\ \cancel{mol}}{1\ \cancel{mol}} \left| \frac{58.44\ g}{} \right| = 1.17\ g$$

Calculations: Example 2

- 100 mL of 20 mM HEPES pH 7.3 (from 1 M Stock):

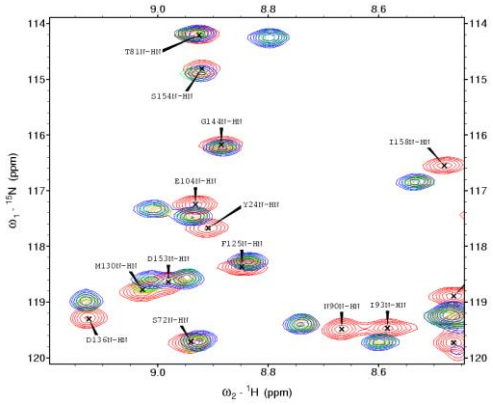
$C_1 V_1 = C_2 V_2$
(100 mL) * (20 mM) = (x mL) * (1000 mM)
x = 2 mL

Who Owns the Notebook

- It Depends:
  - Your research adviser
  - The university
  - The company you work for
  - Generally, not you!
- This means your notebook must stays in the lab
- In most academic settings, making photocopies of the pages are okay and encouraged (but not in industry!)

Handling Complex Digital Data

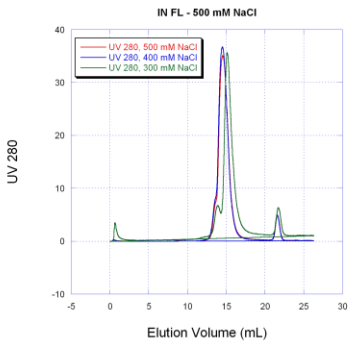
- A printout of typical data should be saved
- Emphasize important points
- Always note where original data can be found



Cross Referencing: Example

- Use text like this:

Chromatogram data is stored on FPLC PC with filename "20100315 Size Exclusion.dat" in the "Smith data" directory. Details given on pg. 65. I collected fractions C1-C5 for further study. A_{280} trace is pasted at right.



Think and Discuss

- In what ways do you benefit by keeping a good lab notebook?
- In what ways do others benefit?

Example Notebook

- Download and examine the example notebook from the boot camp website
- These entries cover a very typical protein expression and purification, including characterization
- Let's take a look…

Summary

- Reasons for keeping a good lab notebook:

- Convenience
  - Know what you did
  - Keep data in one place
  - Continuity between members
- Catastrophe
  - Fraud
  - Professional work ethic
  - Evidence for patent lawyers