Laboratory Notebooks

Biochemistry Boot Camp 2019
Session #9
Suhas Tikole
sst169@msstate.edu

1

Overview

• What is a Lab Notebook?

• What to include in Notebook?

• How to maintain a good Notebook?

• Entry Examples

2

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

3

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

4

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

5

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.

6

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

7

Pen Test

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

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

8

Journal References

First Author   Year   Journal   Volume   First Page

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.

9

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

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

10

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

11

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!)

12

Handling Complex Digital Data

- A printout of typical data should be saved
- Emphasize important points
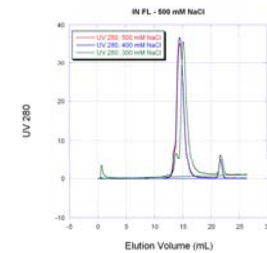- Always note where original data can be found
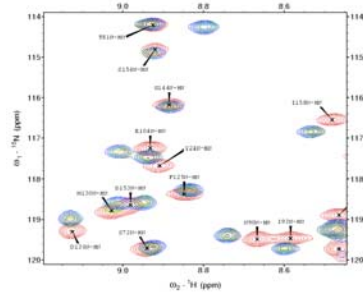
13

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.

14

Think and Discuss

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

- In what ways do others benefit?

15

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…

16

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

17