Lab Notebooks

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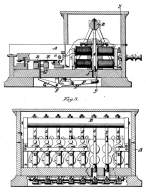
Lab Notebooks

Legal Documents
Critical for establishing "prior art"
Significant evidence in civil litigation
Vital accurate records be kept in clinical situations

1876 – Bell Invents "harmonic telegraph"
1876 – Elisha Gray files brief for telephone patent 3 hours before Bell
1871 – Telephone invented by Antonio Santi Giuseppe Meucci
(did not file a patent)

Bell fortune based on patent application & lab notes: "simultaneous transmission of multiple harmonic tones, possibly even the human voice."



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Lab Notebooks

Must be:
Legible
In pen (Blue or black ink; never red ink!)
Consecutive, pre-numbered pages (often accountants' ledger)
Witnessed
Understandable to someone "skilled in the art"

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Lab Notebooks

Inside cover:
- **Your name & contact information**
- **Your instructor's name, the course/ section #, & your lab meeting time**

Table of Contents:
- **Date, title, & page numbers for each week's lab report**
- **Each week you should update the Table of Contents**

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Writing in the Notebook

Insert the back cover under the copy sheet before writing on a page
Top of each page:
- **Lab #, title, date, your name, name(s) of lab partner(s), course & section #**

- **All data must be entered with ink directly into the journal**
- **Errors corrected by drawing a line through the mistake**

Before leaving:
- **Tear out the original pages, staple and give to your instructor to grade**
- **Trim the edges**
- **Save the copy in your journal as a record of your work.**

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Page 1: Safety Agreement

I have viewed the ACS DVD on Chemical Safety
I understand a seat in the laboratory of CEM 101 is contingent upon:
Arriving on time … I acknowledge the policy of denying a seat for late arrivals
Following all safety rules as defined by the instructor:
- **Dressing appropriately as defined in the lab briefing**
- **Leaving all food and beverages out the lab (or concealed in backpacks)**
- **Leaving all electronic devices (except calculators) in the storage area.**
- **Turning off all cell-phones**
- **Never returning reagents to original bottles**
- **Wearing safety goggles/glasses when advised to do so by the instructor**
- **Leaving the lab bench clean**

Print Name **Signature** **Student Witness** **Date Signed:**

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Required Sections

PURPOSE: (1 point)
Your words (Based on lab handout)

PROCEDURE: (2 points)
Step-by-step list of things you plan to do during the lab
Short, "to do" list
Should not be more than a page

DATA: (4 points) Tables before class; data during class
Record all pertinent information & numerical (quantitative) observations
All measurements with units to the correct number of significant figures
Report any qualitative (non-numerical) experimental information in sentences
Record what you observe in as much detail as is practical

CALCULATIONS: (4 points)
Correct significant figures & unit labels

RESULTS/DATA INTERPRETATION: (4 points)
Tabulate the answers to all the calculations
Any needed graphs or charts

CONCLUSION: (4 points)
Use complete sentences to describe what you learned, determined, or discovered
You must answer the question posed in the purpose of the lab

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Required Sections: Rationale for Order

PURPOSE: (1 point)
Why

PROCEDURE: (2 points)
How

Before Class

DATA: (4 points) Tables before class; data during class
What was observed / measured

CALCULATIONS: (4 points)
Arithmetic on data with appropriate units and sig figs

RESULTS/DATA INTERPRETATION: (4 points)
Summary / Graphs

During Class

CONCLUSION: (4 points)
Answers Purpose

Questions: (5 points)
Tests Understanding of lab principles
Helps prepare to answer exam problems
Done independently ('cause exams are done independently)

Most can be done before class

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Lab Notebook Measurements

Electronic Devices: Record All Displayed Digits

Non-Electronic Scales: Record 1 decimal digit beyond scale
(Will discuss "significant figures" in Unit 3)

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Answer the Questions

No need to copy questions into notebook

I Am NOT a mushroom!

Sources of Answers:

- Lab Briefing Slides
- The Lab Briefing
- Your data

Web Search Engines often give inappropriate answers

In the delta variant world:
Where possible, do questions ahead of class
Staple sheet to lab report

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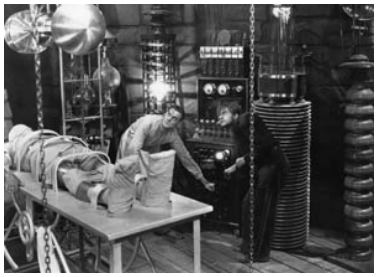
Primary Criteria:

Must contain Enough Material to Reproduce the Experiment



Even if decades have passed!

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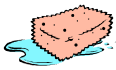

Testing Paper Towels Lab

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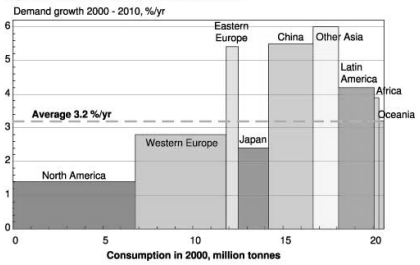
Paper Towels – Not a trivial business

Figure 1: World tissue demand in 2000 - 2010



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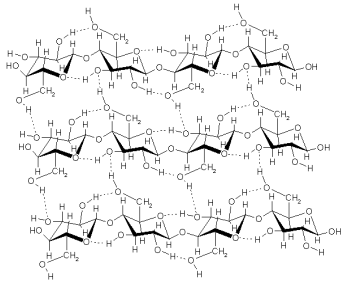
Cellulose (Cotton)



Every Sugar – OH
Can
Grab HOH molecules

A poly-sugar that is capable of attracting many water molecules

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Cellulose (Cotton)

Ability to hold water makes cotton a "great' summer fabric

- **perspiration "grabbed" by cotton fibers**
- **water evaporates**
- **evaporation takes heat**
- **result is a cooling effect**

Ability to hold water makes cotton an undesirable winter fabric

- **evaporative cooling promotes heat loss & hypothermia**
- **water removes heat 25 x faster than dry still air of same temperature**
- **Fogery : > 50% wilderness deaths a result of wearing cotton jeans**
- **Yosemite Rangers: wearing cotton in winter ➔ "death-seeking behavior"**

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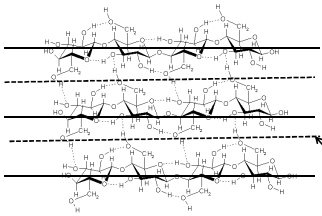
Cellulose (Cotton)

Ability to absorb water depends upon amount of cellulose present

Strength depends upon molecular orientation of polymer strands



Strong Chemical Bonds

Weaker "Hydrogen Bonds"

Tearing Occurs Between Strands

Molecular Architecture Defines Macro Behavior

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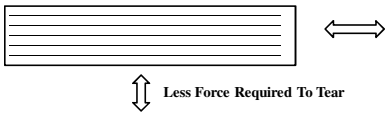
Cellulose (Cotton)

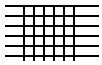
Mechanical Strength Dependent on Direction of Force Applied

Strongest along Direction of poly-sugar strands



Less Force Required To Tear

Mechanical Strength gained by orientation of poly-sugar strands



Each layer (ply) a different direction

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Assume YOU are Quality Control Lab

Need to:

Determine Your Product Marketing Strengths

Market best feature – strength vs. absorbency

Compare Your Product to Others

Are you the best?

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Absorbency = Measure of ability to absorb water

Two Basic Measurements:

Mass
Volume

Suggestions?

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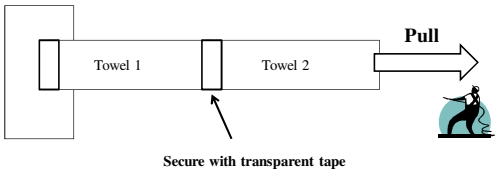
Strength = Resistance To Tearing



Secure with transparent tape

Towel that rips is the weakest
If break occurs at the tape, need to redo test
If break occurs on only one ply, consider it a tear

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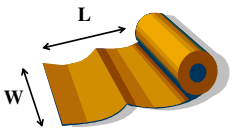
Strength Test



Strips:
Same size for each test strip
Width vs. length for each brand
Strongest (of each brand) against other brands

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The Lab Today

I. Determining the Absorbency of Paper Towels
- **Work with a partner**
- **Agree on a set of procedural**
- **Carry out your plans**
- **When finished, clean & dry all glassware: put away all equipment**

II. Determining the Dry-Strength of Paper Towels *(for each brand)*
- **Cut one sheet into 4 lengthwise strips, 20 cm long by 5 cm wide**
  - **Code them BRAND-L (for BRAND, lengthwise direction)**
- **Cut another sheet into 4 widthwise strips, 20 cm long by 5 cm wide**
  - **Code these strips BRAND-W (for BRAND, widthwise direction)**
- **Strengthen one end of each strip by putting tape on it**
- **Use tape; fasten together 1 BRAND-L strip to 1 BRAND-W strip**
  - **Fasten one end to the lab bench**
- **Pull the free end of the taped strip until one breaks**
- **Record which strip is stronger, that is which doesn't break**
- **Repeat to make sure the same strip (L or W) breaks first again.**
- **Test the stronger strip for each brand against each other brand**
- **Repeat to make sure the same strip breaks first again.**
- **Report strongest brand**

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Notebook Pages should include:

- **Purpose: What you intend to accomplish by doing today's lab work**
- **Procedure: What you will do**
- **Data: Record your measurements / observations**
- **Calculations: Show any calculations**
- **Results: Report in an organized table**
- **Conclusion: Describe paper towel brand strength & absorbency**

Don't Forget the questions!

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Let's Boldly Go Explore Today's Lab

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