Writing in the Sciences & Engineering
GSAS Seminar
February 23, 2006

Exercises

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Accuracy

Exercise 1: Use some of these proofreading strategies to identify the spelling and grammatical errors in the letter on the next page. How many errors are there?

How to Proofread

1. *Divide and Conquer!* Proofread AFTER you’ve planned, drafted, and revised your work, when you can give proofreading your full attention.

2. *Take a break!* Whenever possible, proofread after a time lapse, ideally overnight, so that your memory of what you intended to write won’t keep you from seeing what’s really on the paper.

3. *Slow down your eyes!* If you’re writing on a computer, use the right arrow key to move the cursor across each word. But be sure to proofread the printout too, tapping each word with your pen.

4. *Read aloud!* Read your paper aloud so that you can hear some problems that you might not have seen.

5. *Copy and paste!* Whenever possible, copy and paste complex equations or statistics from your data files and URLs from your web browser. (But don’t plagiarize.)

6. *Red-check!* Using a red pen, check off numbers on your draft while comparing them with the numbers in the original sources.

7. *Check it out!* Consult a checklist as you proofread, or use computerized grammar and spelling checkers (with a grain of salt).

8. *About face!* Read your paper backward, sentence by sentence, to catch errors in sentence structure.

9. *Know thyself!* Identify your most common error, and proofread once, looking for only that error. Then, proofread again, looking for all types of errors.
Dear Mr. Dahlem:

In response to your advertisement in IEEE Spectrum (August 1990), I am writing to apply for the position of Bipolar Development Engineer. After considering you’re challenging requirements, I believe that my experience and educational background would enable me to make significant contributions to your expanding division. My background includes the following:

- **Employment by the Electronic Physics Laboratory, Brookfield Polytechnic Institute.** I participated in designing an innovative computer modeling process of a submicron device I was responsible for designing the numerical analysis subroutines of the computer program.

- **Completion of a senior design project in designing and fabricating bipolar device chips using state-of-the-art techniques.** I was also responsible for testing and characterizing the device chips.

- **Completion of several graduate courses in semiconductor devices, integrated circuits, and digital logic circuit design.**

I will receive my B.S.E.E. from BPI in August 1990 and would appreciate being considered for permanent employment thereafter. I will call you next Wednesday to set up an interview at your convenience. If you desire additional information, I can be reached at (555) 270-4381.

Thank you for your consideration.

Sincerely,

Perry C. Culbert
Brevity

Exercise 2: Shorten the following sentence without losing information or changing the meaning. How long is your sentence?

Attempts were made on the part of the engineering staff in regard to an assessment of the project.
Exercise 3: Which version did scientists prefer?

Brown’s Version
In the first experiment of the series using mice it was discovered that total removal of the adrenal glands effects reduction of aggressiveness and that aggressiveness in adrenalectomized mice is restorable to the level of intact mice by treatment with corticosterone.

Smith’s Version
The first experiment in our series with mice showed that total removal of the adrenal glands reduces aggressiveness. Moreover, when treated with corticosterone, mice that had their adrenals taken out became as aggressive as intact animals again.
Revising for a Lay Audience

Original Version
A three-phase set of currents in an armature winding produces a uniform rotating magnetic field BS. Therefore, there are two magnetic fields present in the machine, and the rotor will tend to line up with the stator field. Since the stator magnetic field is rotating, the rotor magnetic field (and the rotor itself) will constantly try to align itself.

Unsuccessful Revision for Lay Readers
A three-phase set of voltages is applied to the stationary part of the motor (the stator), which produces a three-phase current to flow in the copper coils (windings). Three-phase currents are a set of three voltages that are in the shape of a sine wave, have equal magnitudes, and are spaced 120 degrees apart with respect to a common reference point. A three-phase set of currents in an armature winding produces a uniform rotating magnetic field BS. The armature is the rotating part of the machine also called the rotor. Therefore, there are two magnetic fields present in the machine, and the rotor will tend to line up with the stator field.

Successful Revision for Lay Readers
Synchronous motors are machines used to convert electrical power into mechanical power. You can find such motors in tape recorders and large clocks. As the diagram below shows, a synchronous motor has a stationary part called a stator and a rotating part called a rotor. When three alternating electrical currents are applied to the stator, they produce two magnetic fields in the motor, a stator field and a rotor field. The rotor field will try to line up with the stator field just as two bar magnets will tend to line up if placed near each other. Since the stator magnetic field is rotating, the rotor magnetic field (and the rotor itself) will constantly try “to catch up.”
Adapting to Audiences

for specialist audiences: important technical terms, conventional format, raw data, precise values, graphs, tables, equations, methodological details, citations

for managerial audiences: key information “up front,” concise summaries, straightforward conclusions and recommendations, “the bottom line”

for nonspecialist audiences: familiar formats, overview, background information, short explanations (Why? So what?), synonyms or definitions, concrete examples, visuals, familiar comparisons, human interest, low information load per sentence

for international audiences: simple sentence structure, low information load per sentence, as few idioms as possible, visuals, culturally universal examples and comparisons

for mixed audiences: “layered” documents with sections aimed at different audiences OR “democratized” documents written so that everyone can understand all parts
Design

Chemistry Lab Report

Title (2 pts.)
The title page must contain the title, your name, your affiliation (course number/section, department, university), and report date. The title must be descriptive and concise, and no more than 100 characters, including spaces.

Abstract (10 pts.)
Provide a sentence or two to define the experimental objectives. Give a very precise account of what you did and provide precise data that support your results. Indicate the highlights and significance of your experimental findings. The abstract should be less than a half-page (double-spaced). Include five keywords.

Introduction (4 pts.)
You should start the introduction on a new page. Discuss the theoretical aspect of the experiment and refer to previously known aspects of the experiment. The last paragraph must state very clearly what you specifically intend to do in the experiment. The introduction should be less than two pages (double-spaced).

Experimental Procedure (4 pts.)
You should start the experimental procedure on a new page. In a narrative format, describe the equipment that you used and the experimental conditions of the equipment. Give the reagents and the experimental procedures. If you followed the text without any changes, simply indicate that you followed the procedure as outlined in the text and cite the text as a reference. If you made some changes in the text procedure, then indicate what the changes are and similarly cite the text as a reference.

Results and Discussion (18 pts.)
Start this on a new page. In this section, you have the opportunity to discuss the significance of your data. Whenever possible, arrange your results in tables and then refer to the tables in your discussion. Refer to your line drawings, charts, chromatograms, and spectra as figures. Discuss your observations and relate them to the experimental results. Provide possible explanations for some of your observations and results. You may offer suggestions as to how the experimental procedure could be improved. Whenever appropriate, the eighteen points for this section will be further apportioned as follows: table(s) for results (5 pts.), legend for figures (5 pts.), discussion of results (8 pts.).

Page of Legend
This is graded as part of the results and discussion. The page of legend must contain informative detail about each of the figures.

Acknowledgment (0 pts.)

References (2 pts.)

General Writing Proficiency (grammar, diction, wordiness, etc. - 10 pts.)

*courtesy of Professor Folahan Ayorinde, Department of Chemistry, Howard University
**Exercise 4:** Study the two versions of the lab report on the following pages. How does the revision follow these design principles? What typographic tools does the writer use?

## Design Principles

A well-designed document shows the reader the following:

- how the document is organized.
- where the reader is in the document.
- which items are most important.
- how items are related.
Temperature and Pressure Measurements of an Ideal Gas That Is Heated in a Closed Container

This report discusses an experiment to study the relationship of temperature and pressure of an ideal gas (air) that was heated in a closed container. Because the ideal gas was in a closed container, its volume remained constant. The objective of the experiment is to test whether the ideal equation of state holds. In the equation, \( pV = mRT \), where \( p \) is the pressure the gas, \( V \) is the volume, \( m \) is the mass, \( R \) is a constant, and \( T \) is temperature. This report presents the procedures for the experiment, the experiment's results, and an analysis of those results.

In this experiment, air (an ideal gas) was heated in a pressure vessel with a volume of 1 liter. Attached to this pressure vessel was a pressure transducer and thermocouple to measure the pressure and the temperature, respectively, of the air inside the vessel. Both of these transducers produced voltage signals (in Volts) that were calibrated to the pressure (kPa) and temperature (K) of the air (the atmospheric pressure for where the experiment occurred is assumed to be 13.6 psia). In addition, the theoretical temperature (K) of air was calculated as a function of the measured pressured values (kPa).

This section analyses the results of the experiment. The experiment went as expected with no unusual events that would have introduced error. The voltages as measured for the pressure and temperature transducers appear in the Appendix. Also included in the Appendix are the equations used for calibrating those voltages with the actual pressures and temperatures. These equations led to the values of pressure and temperature. As can be seen, the relationship of temperature versus pressure is roughly linear.
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Introduction

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Procedures

In this experiment, air (an ideal gas) was heated in a pressure vessel with a volume of 1 liter. Attached to this pressure vessel was a pressure transducer and thermocouple to measure the pressure and the temperature, respectively, of the air inside the vessel. Both of these transducers produced voltage signals (in Volts) that were calibrated to the pressure (kPa) and temperature (K) of the air (the atmospheric pressure for where the experiment occurred is assumed to be 13.6 psia). In addition, the theoretical temperature (K) of air was calculated as a function of the measured pressured values (kPa).

Results

This section analyses the results of the experiment. The experiment went as expected with no unusual events that would have introduced error. The voltages as measured for the pressure and temperature transducers appear in Table A-1 of the Appendix. Also included in the Appendix are the equations used for calibrating those voltages with the actual pressures and temperatures. These equations led to the values of pressure and temperature that are shown in the third and fourth columns of Table A-1. From these values, a graph between temperature (K) and pressure (kPa) was created (Figure A-1). As can be seen from the graph, the relationship of temperature versus pressure is roughly linear.
Table A-1. Data From Experiment

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<th>Voltagepres (V)</th>
<th>Voltagetemp (V)</th>
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<th>Temperaturemeas (K)</th>
<th>Temperatureideal (K)</th>
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</table>

Figure A-1. Temperature versus pressure, as measured by the transducers.

Source: http://writing.eng.vt.edu/