

## Important Note for Writing

*(Last updated: Nov 5 2013)*

### A. General Writing

#### 1. For Objectives and Conclusions

Even though the true objective of our experiments is to learn something, to achieve the goal of learning writing such as reports, it must be written with the **experimental objective** in mind. Objectives and Conclusions are related to the EXPERIMENT, not with the learning experience.

For example:

Incorrect Objectives:

- to practice with different instruments
- to learn procedures for calibration

Correct Objectives

- to measure the dimensions of a block and estimate the uncertainty
- to evaluate the energy needed to heat water to the boiling point.

The proper statement of the objectives affects the Conclusions greatly. For example:

Incorrect Conclusions

- the objectives of the lab have been met. We learned the use of different measuring instruments and how to propagate errors.
- the team worked well and the experiment was successful.

Correct Conclusions

- the dimensions of an aluminum block were measured using calipers and micrometers. Unexpectedly, the uncertainty was found higher for the caliper. Possible reasons could be . . . The measured long side length was  $100 \pm 1$ , 2% higher than the reported value of the manufacturer. ...

- The energy needed to heat up water from 20 C to the boiling point was found by measuring the temperature evolution of the water. The value obtained,  $XXX \pm YY$ , was 50% higher than the theoretical prediction. The main cause is the heat losses to the environment. It is concluded that this method is not adequate to measure the heat capacity of water. Possible improvements are ...

## 2. For discussion

Simply attach the plots/tables or list the numbers of the results is not discussion. You need to clearly state “what did you find” in your experiment with the experimental data in detailed. One typical expression as an incorrect “discussion” is that, “The results of step 1 can be found in Fig X, which is as expected”.

A general guideline can be found in the syllabus (page 19 under results and discussion), which is helpful for both logbook and report writings.

## 3. Uncertainty analysis

Similar to <2 For discussion>, only listing the calculation of the uncertainties is not an analysis. You need to identify elemental errors and the procedures to obtain a final uncertainty, and discuss their influence or contribution to the final uncertainty. A good example can be found in the following reference (8.4.1, page 21 to 23).

<http://www.engineering.uiowa.edu/~cfd/pdfs/References/uncert.pdf>

4. Read the " Report and Memo Format" before you begin to write your memo and report (included in the syllabus), be aware of the format and related requirements (e.g. equations, plots)

5. Write your reports and memos in such a way that FORMAL technical report should be.

E.g. one typical incorrect writing is (worse if occurred in abstract): The group used digital micrometer to measure dimensions of an aluminum block.

Correct one is: Dimensions of an aluminum block was measured by using a digital micrometer.

Thus, focus your reports and memos on your experiment, not how you or your group learned or obtained what by doing the experiment. What readers of your report really want to know are for the experiment, the results and your discussions on them.

6. Do NOT copy the write-up, especially the objectives.

## **B. Report**

### 1. Overall

- Read the section <Technical Reports> in the course syllabus for detailed guideline.
- Read the <Report Grading> in the course syllabus for grading criteria.

### 2. Quick tips

-- **Results and Discussion is the main part of the report.** Need detailed discussion for the results, for instance, explain any anomalies in your data, describe and reason the trends of your results, explain/comment on the physical behaviors of the plots; simply listing results/calculations etc. is not sufficient.

-- Be quantitative for discussion and uncertainties analysis.

-- Figures, tables and equations need to be referred to within the text; they need to be placed in the report in the order that they are referred to in the text (e.g. you should not be referring to Figure 2 unless you have already referred to Figure 1).

-- Label your graphs and tables appropriately.

-- Use appropriate format for figures, tables and equations (detailed description can be found in <Technical Reports> of the course syllabus).

-- Proofread. There should be no grammar, spelling, or capitalization errors.