

## GUIDELINES FOR WRITING A SCIENTIFIC REPORT

There are many ways to write a scientific report, and while these guidelines may not be exactly the same in every laboratory and in every field of science, they represent a typical set of guidelines. The preliminary and final reports should be written in the style of a formal paper. The format and content guidelines expected for this type of report is outlined below. All reports must be typewritten (preferably using a word processing program) and **double-spaced**.

### *Organization*

A typical report should be organized along the following lines:

- A Cover Page, with the title, author and date of submission
- An Introduction – The introduction should clearly state what you are reporting on in this paper (e.g., for your Preliminary Report, you are reporting the preparation of the coordination complex,  $K_3[Fe(C_2O_4)_3] \cdot 3 H_2O$ ). The introduction should also give some background information (e.g. a description of coordination compounds, what they are, why they are important and how this is related to the work you are reporting in the paper). Balanced chemical equations should be included for all but the most trivial reactions (For the Preliminary Report, the two equations in the methodology section of experiment 12-090 should be included in the introduction, these chemical equations are a concise way to describe the general synthetic procedure). Equations should be set off as separate lines and should be numbered in the right hand margin. For the Preliminary Report, you should mention future plans (i.e. discuss the characterization of the synthesized compound).
- Experimental – This section should include what you actually did in the laboratory. This may deviate from what the manual asked you to do. Materials should be described in the text and you should note if any special handling or preparation procedures were used. You should report masses (and number of moles) or volumes of each chemical used and concentration of solutions. You should mention volumetric glassware where appropriate. This section should be in essay form, and in your own words. Do not rewrite the laboratory manual instructions – write what you actually did, this may differ a bit from what was written in the lab manual. The experimental section should be divided into subsections using subtitles. For example, the synthesis of the coordination compound can be divided into three subsections with the subtitles, *Preparation of iron (II) oxide*, *Preparation of  $K_3[Fe(C_2O_4)_3] \cdot 3H_2O$* , *Isolation of  $K_3[Fe(C_2O_4)_3] \cdot 3H_2O$* .
- Results – This section should describe what happened as a result of your experimental work. For the Preliminary Report, this section should include your observations (e.g color changes, temperature changes, gas release, etc.) made during the synthesis of your product, as well as, a description of your product, actual yield and theoretical yield. You should also identify the limiting reagent for each reaction.

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- **Discussion** – In this section you will interpret your results. A discussion of standard errors should be included here (i.e. discuss what errors may have contributed to loss of product). You should also discuss what you are going to do with your product (i.e. analysis of product).
- **Footnotes and References** – You should reference any and all literature sources that you used, if you refer to them explicitly in your report. You should include appropriate references at the end of the paper and include citation marks in the body of the paper. At the very minimum, in your Preliminary Report, you should cite your text and your lab manual. You should assign a number to each citation based on the order in which you cite them in your report. The number should follow the text. Use either superscript or parenthesis. List the sources at the end of the report as end notes and order the citations numerically. There are several acceptable formats for references. One very commonly used by chemists is the ACS format:

1. For journal articles: authors' surnames and initials, abbreviated journal title (italicized or single-underlined), year (bold-faced or double-underlined), volume (italicized or single-underlined), inclusive page numbers.

Mann, C.J.; Weiner, H. *Prot. Sci.* **1999**, 8, 1922-1929.

2. For books: authors' surnames and initials, book title (italicized or single-underlined), edition; publisher: city, year; chapter or inclusive page numbers.

Silberberg, M.S., *Chemistry, The Molecular Nature of Matter and Change*, 4<sup>th</sup> ed.; McGraw Hill: New York, 2006; p. 1017.

3. For a book with an editor and no author: editor's surname, first name and middle initial, ed. book title. (italicized or single-underlined), city: publisher, year.

Chanatry, Julie A., *Chemistry 102 Laboratory Manual*. Hamilton, NY: Colgate University Printing, 2007.

- If you refer multiple times to the same citation in one report, do not repeat it in your reference list; reuse the superscript number with which it first appears in your paper.

### **General Instructions**

The purpose of a scientific report is to describe an experiment to an audience *with about the same background as yours*. Your job is to clearly and briefly tell what you had hoped to discover or prepare, what you did, what actually happened, and what you think the results mean. You must not assume that the reader has ever done the same experiment, so you must describe the procedure well enough that they can understand and evaluate your work. You must include enough original data, and indicate how you used it, so that a skeptic could repeat the calculations and check your results.

Significant figures are important, for weighing out 10 g of a material is different than weighing out 10.0000 g of the same material. Claim all the credit you deserve for careful work – if you weighed out 5.4321 g, say so – don't round to 5.4 g. By the same standard, don't lie – if you started with 10.0 g of a limiting reagent (so the mass is known to 1 part in 100, or 3 significant figures), don't report a percent yield of 25.896839485 %. Rounding to 3 significant figures (25.9%) is all you are entitled at that point.

### *Some Conventions*

- Scientific writing is done in passive, third-person voice. For example, for the first experimental step in experiment 12-090, one might write, “A 10.000 g ( $2.5501 \times 10^{-2}$  mole) sample of reagent grade ferrous ammonium sulfate hexahydrate was added to a homogenous solution of 30 mL of water and 0.1 mL of 6 M  $\text{H}_2\text{SO}_4$  and mixed well.”
- You should not use the imperative tense. The laboratory manual may say “Prepare a solution by dissolving 10.0 g of...”, but in a formal report, you would write “A solution was prepared by dissolving 10.0 g of...”
- One of the prime rules of teaching – KISS or “Keep It Simple, Stupid” should apply to report writing. Remember it is important to be clear and concise.
- Slang or vernacular should be avoided. A few abbreviations are acceptable (*e.g.*, mL, g, s).
- Sentences should begin with a capital letter – not a number. It is tempting to write: “22.0 g of NaCl was...” This should be reworded to something like “A 22.0 g sample of NaCl was...”

### *Final Comments*

The proper methods for acknowledging your sources and avoiding charges of plagiarism are thoroughly covered in the Colgate Student Handbook. Don't risk a certain course grade of F, and possible suspension from Colgate by copying your laboratory partner's (or anyone else's) work.