Chemistry Laboratory Report Style Guide

General notes

- Lab report must include:
  - your name and your lab partners' name(s), clearly labelled as such.
  - the experiment number and title, *i.e.,* "Experiment 4: Synthesis and reactivity of ferrocene".
  - the date(s) that the experiment was carried out.
- Chosen font should be easy to read (both size and style wise)
- Be consistent - use one font throughout the document (note: captions can be different from main text)
- Double check your work for typographical mistakes before submission
- Use subscripts correctly, *i.e.,* H_2O **not** H2O, and use superscripting correctly, *i.e.,* 10^{-5} **not** 10^–5 and **not** 10E–5
- The names of elements and chemicals should not be capitalised, *e.g.,* "My favourite element is phosphorus" (**not** Phosphorus), although there are some exceptions.
- Figures should be referred to a explained in the main text. The reader should be told when to look at the figure and what the figure tells/shows them.
- Figures should be newly drawn where possible using appropriate software
- Take care with unit spacing. There should be a space between the number and the unit, and also within units, *e.g.,* 132.25 g mol^{-1} **not** 132.25gmol^{-1}.
- Wherever possible, include a comparison to a literature value and include the literature reference in your report, cited in the standard Royal Society of Chemistry (RSC) format.

Language

- Text should be written in the passive voice (avoid 'I', 'we', 'our', 'my', *etc*.)
- Use the proper tenses when describing work and findings, being consistent:
  - Use present tense for known facts and hypotheses, *e.g.*, "the average life of a honey bee **is** 6 weeks..."
  - Use past tense to describe experiments that have been conducted and the results of these experiments, *e.g.*, "The average life span of bees in the laboratory environment **was** 8 weeks..."
- Keep tenses within a unit of text (paragraph, sub-section or section) the same
- Latin phrases should be correctly abbreviated (pay attention to where periods are needed) and formatted (always in italics), for example,
  - *et al.*, not *et. al* (period in the wrong place), et al. (not in italics), or *etal.* (no space)

Experimental (when required)

- A summary highlighting the main features of how the experiment was done including sufficient detail that another chemist could repeat the experiment
- Does not need to include equipment or glassware like round-bottomed flasks/stirrer hotplates/Buchner funnels, *etc.,* but should include processes, heating, time *etc.*
- If a compound/material/complex *etc.* has previously been reported, a reference to it should be given and a statement saying that the obtained data agree/does not agree with the literature should be included
- Should include observations such as colour changes, gas evolution, precipitate formation *etc.*
- Include masses and amounts of reagents used, *e.g.*, reagent (2.5 g; 2.1 mol) with consistent significant figures
- Include masses and yields of products formed, *e.g.*, yield 1.23 g (56%)
- Yield (g) should never be reported to more than 3 significant figures
- Percentage yield (%) should always be an integer number (never report decimal places)
- Avoid overly frequent use of "was", "was then", *etc.*
- Analytical data (NMR, IR, MS, mp, bp, pressure, GC-FID, GC-MS) should be included in the standard RSC format

Calculations

- Analysis should be shown in sufficient detail for the analysis to be repeated by the reader
- Avoid repeated detailed workings, tabulate raw data and calculated data, and refer to equations used
- Use the MS Word equation editor or equivalent (*e.g.*, MathType) for non-trivial equations
- Scalars should be typeset in italics, even in text
- Units should be included throughout calculations
- Mathematical equations are part of sentences. They may be displayed on a separate line and centred, but not positioned elsewhere in the document. They do not have captions but can be numbered for reference elsewhere.
- Take care with use of significant figures – in general, quote values to the significant figures of the error and errors to 1 significant figure (2 figures if the uncertainty value starts with 1)

ChemDraw Diagrams (*e.g.,* for figures, reaction schemes, mechanisms, *etc.*)

- Draw figures in ChemDraw and insert them properly into your document
- A caption should be included **below** each figure or scheme (and also below any balanced chemical equations)
- Ensure structures are realistic and bond angles are drawn correctly – use templates where possible
- Be consistent with bond lengths
- Use curly arrows that do not obscure text/bonds/charges, and start/finish in the correct place
- Include lone pairs and charges where appropriate
- Molecules and arrows should be aligned properly (where appropriate)
- Both text and diagrams should be large enough to read easily
- Take care with fonts in each diagram – avoid using several different fonts in one scheme
- Use the same ChemDraw template to ensure the size of molecules is consistent throughout a document
- Take care with subscripts and superscripts: R_x= x times R (*e.g.,* PR_3 = three R groups); R^x = a variable substituent

Tables

- A 'Table X' title (explaining what the table contains) should be included **above** the table
- Should have clearly defined columns and rows
- Units must be included in column and row headings, *e.g.*, "wavelength / nm" **not** "wavelength (nm)"
- Ensure data in the table are in the same units as given in the headings
- Use a sensible number of significant figures, and a consistent number of decimal places

Graphs

- Should be large enough to be clearly seen and the data interpreted
- Graph background should be plain and free from distracting gridlines
- Do not include a box around the outside of a graph (MS Excel default). However, axes may sometimes define a box.
- Use the minimal amount of ink/pixels to clearly show the data, but all lines should be thick enough to be clearly seen
- Tick marks should be included on each axis
- Data point markers should be small and neat, but should not consist of very thin lines or have drop shadows
- Raw data should be included as data points and the fit of raw data to any model should be drawn as a solid line
- A figure caption should be included **below** each figure. NOTE: A graph title should not be included in the graph itself – this is not necessary as the figure caption should inform the reader as to what the graph shows
- Axes must be fully labelled and include units, *e.g.*, "wavelength / nm" (**not** wavelength [nm])
- The label for the x-axis should usually be below the axis, while the label for the y-axis is typically to the left of the axis (rotated by 90 degrees anticlockwise). The x-axis appears at the bottom and the y-axis at the left of the data area.
- Use the correct "axis crosses at" value in MS Excel even if the value is negative
- Refer to axes by the quantity they show, not generic x and y
- Take care with the number of decimal places on axes – be consistent
- Avoid redundant zeros on tick labels (*i.e.,* 2.1 **not** 2.1000)
- Consider whether several sets of data could be included in one graph with a key
- Rescale the axes to make the best use of the space. If the origin (either in x or y or both) is important, include it. Otherwise, do not. Some graphs need to show the origin (0,0) and a fully numbered axis without breaks.
- Include error bars where appropriate

Analytical data - Spectra

- When recording spectra include your name and sample name (not just "experiment 1 product")
- Include full A4 copies of any spectra that you record as an appendix to your report (unless otherwise stated). Cropped copies may be included additionally
- For NMR spectra give the nucleus, solvent and acquisition frequency
- For IR spectra, UV-Vis spectra, *etc.*, state how the sample was run and what medium/solvent was used

References

- In MS Word, use the 'References' tab and then 'Insert Footnote' or use 'Insert Endnote' to put in references
- Each individual reference should only appear once in the list of references. Use cross references if multiple citations of one reference are needed.
- Be consistent with referencing style within a report, for example:
    - **Journals:** Author(s), *Journal*, year, **volume**, page(s)
      Books: Author(s), 'Book title', publisher, town, date (or edition), page number(s)