

Grammar, Style, and Usage in a Chemistry Paper

Warning: *The Surgeon General has determined that poor spelling or grammar can be hazardous to your career.*

Disclaimer: *This is not a comprehensive list of rules. It just covers some of the more common mistakes. For more details see:*

ACS Style Guide, Janet S. Dodd, Editor

Topics

General Tips

Past and Present Tense

Capitalization

Italics

Spaces, Hyphens

Units, Abbreviations

Formatting References

Figures and Schemes

General Tips

Before you hand anything to your advisor or committee, please read it over and proofread it.

If you can't be bothered to read it over once, why should your advisor?

Suggestions:

- Don't ignore the Microsoft Word and PowerPoint grammar and spelling checkers.
- Have someone else read it. (beg, bribe, or shame)
- Read it aloud.
- I almost always have my computer read aloud what I have written.* It is amazing what looks okay on paper but is clearly wrong when read aloud.
- Identify the types of mistakes that you commonly make. So you can fix them next time.

* (Mac) Use the text-to-speech command in the **Universal Access** control panel.
(Windows) Narrator (Windows Key-U)? May require separate 3rd party program.

Use Proper Grammar

Microsoft Word grammar checker can catch many common errors*
Problematic sections of a sentence are highlighted with a squiggly green underline. Right click on phrase to see problem and suggested corrections.

- Plural subject and singular verb

The compound were diluted with 10 mL chloroform.

- Missing comma before a clause starting with *which*.

The structure of **15** was consistent with the *endo-conformer* which was the expected conformer.

*Exceptions: Microsoft grammar checker will also identify passive sentences, which are common in chemical documents.

Missing articles (*the* and *a*) are not identified.

commonly mistaken singular words

Terms that refer to a group can be singular:

series, dozen, group, data,* pair, variety, group, couple, number, etc

A **series** of compounds **was** tested.

Experimental **data** that we obtained **is** compared with previously reported results

None of the samples **was** soluble.

Units of measurement are treated as collective nouns and are singular.

5 grams of NaCl was added.

The mixture was stirred, and **5 mL of diluent** was added.

* **Data** is formally the plural of datum, but since it refers to a set of results, the ACS style Guide says it can be singular. On the other hand, **spectra** is the plural of **spectrum** and should always be plural.

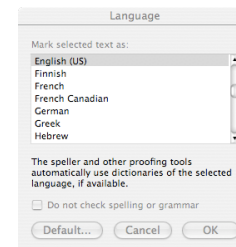
Use Proper Spelling

The **Microsoft Word spelling checker** will not know many chemistry and scientific terms. So, many terms will be underlined in red.

1) Don't ignore it. Train it. *

Make sure the word is spelled correctly (I use Google). Then **add** the correctly spelled words to your dictionary (right-click).

* Some manuscript templates will turn off the grammar and spelling checker in the language dialog. To turn it back on, under the **Tools menu** select **Language**. Make sure that it is US English and make sure the "Do not check spelling or grammar" box is **not** checked.



2) Download and install chemistry dictionary for Microsoft Word

<http://www.chemistry-blog.com/2008/12/17/chemistry-dictionary-for-word-processors-version-20/>

Proper tense in a paper

All descriptions of results and experiments should be in the **past tense**.

Compounds **12** and **13** **were** synthesized via Diels-Alder reactions.

The reaction mixture **was** diluted with water (100 mL), and the precipitate **was** isolated by suction filtration.

Analysis of data and results can be in the **present tense**.

The peak at 4.65 ppm in the ¹H NMR spectrum **corresponds** to the ortho-aryl proton H15.

Do not switch tense in the middle of a sentence.

To Capitalize or not to Capitalize

You **should** only capitalize.

- 1) First word of a sentence.*
- 2) Nouns in a Title.
- 3) People's names: Avagadro's number, Lewis acid, Schiff-base, Gram-positive
- 4) Figure 1. Table 3. Scheme 5. Chapter 3. Appendix 6.
- 5) People's names that have become adjectives: Gaussian, Newtonian, Cartesian.
- 6) Trade names: Microsoft Word, Plexiglas, Teflon
- 7) Certain abbreviations: X-ray, UV-vis, mM, mL, pH
- 8) Acronyms: NMR, MIP, DCC, DEAD, GC, LUMO
- 9) Genus names: *Bacillus subtilis*, *Pneumococcus aureus*

* **Try not to begin a sentence with a number.** Rewrite sentence to avoid starting with a number. "12.5 mL of 1.0 N HCl was added to the reaction mixture." becomes "To the reaction mixture, 12.5 mL of 1.0 N HCl was added."

To Capitalize or not to Capitalize

Do not capitalize.

- 1) Chemical names!! (benzene, fluorescein, phthalimide)
- 2) reference 3 page 32
- 3) structure **10** compound **12**
- 4) Certain abbreviations should be lower case: (otherwise they may mean something else)
m (meter), g, kg, s (second), min, l (liquid), s (solid)
- 5) If you start a sentence or title with a chemical name the prefixes (i.e. *trans*, *ortho*, etc), it is not capitalized.
i.e. *o*-Dichlorobenzene was the solvent.
- 6) Full names of elements: hydrogen, sodium chloride, potassium
- 7) Headings in tables or labels in schemes or figures.

Italicize

- 1) Chemical **prefixes**: (but not di-, tri-, tetra-)
cis-, *ortho*-, *m*-, (*R*)-, *dll*-, *E/Z*-, *syn*-, *threo*-, *exo*-, *N*-, *tert*-, *iso*-
- 2) **Variables** in an equation:
l (*length*), *x*-axis, $y = ax + b$ (*y*, *x*, *a*, *b*)
- 3) Italicize for **emphasis**:
In a long sentence, you can italicize *the key parts that you want to highlight*.
- 4) Abbreviations for **terms that vary** and **constants**:
K (*association constant*), *J* (*coupling constant*), *A* (*absorbance*), *T* (*temperature K*), *k* (*Boltzmann constant*), *R* (*gas constant*)
- 5) Titles and abbreviations of books and journals:
ACS Style Guide, *J. Am. Chem. Soc.*

*ACS Guide suggests **not italicizing** Latin terms:

ab initio, *a priori*, *in vivo*, i.e., *ca*, e.g.

Spaces

Put spaces:

- 1) After numbers and before units:
10 mL 55.5 min 23 °C 298 K
exceptions: 120° (this means angle not temp) 55% 1/2
- 2) Around mathematical operators =, x, ± with values on both sides.
 $V = 12.5 \text{ mL}$ 3.23 ± 0.01 $5 \times 3 = 15$
exceptions: -12.5 °C 25 g (±1%) 1/2

Do not put spaces:

i.e. e.g. Ph.D. i.d. (inner diameter)

Hyphens

- 1) After stereochemical prefixes and numbers in a chemical name:
cis-stilbene 1,2-dichlorobenzene
- 2) A number or unit of measure used as an adjective (before a noun):
125-mL flask 20-mL aliquot*
exception (temp & conc.): 37 °C water bath 0.1 M NaOH solution
- 3) To link two names:
Friedel-Crafts Jahn-Teller Stern-Volmer Michaelis-Menten
- 4) proton NMR? (ACS says no but other journals say yes.)
¹H NMR (*preferred*) ¹H-NMR (*not ACS format*)
- 5) To link turn an adjective and a noun into an adjective
self-assembly shape-persistent well-defined solid-state catalyst-based

* This looks a bit weird sometimes. So, we often rewrite to avoid the hyphen.

"An aliquot of 20 mL was added."

Units

Unit abbreviations do not need a period but need a space before.

15 min 4.5 μL $1 \times 10^{-9} \text{ m} = 1 \text{ nm}$

Capital or lower case can make a big difference:

M (molar) vs. m (meter) L (liter) vs. l (liquid)

Micro- and milli- are different:

μL (microliter) vs. mL (milliliter)

For compound units, use a center dot or space:

watt per meter kelvin = $\text{W}/(\text{M}\cdot\text{K})$ or $\text{W}\cdot(\text{m}\cdot\text{K})^{-1}$ or $\text{W m}^{-1} \text{ K}^{-1}$

Use the correct significant figures based on error not on Excel:

9.1 Hz (NMR) 0.1251 abs (UV-vis)

General rules on abbreviations

Acronyms (where we take multiple letters) are **all caps**:

AIBN COSY DABCO

Otherwise the abbreviations are **lower case**:

rt (room temperature) equiv (equivalents) calcd (calculated)
ppt (precipitate)

Most abbreviations do not need periods:

exceptions: Ph.D. B.S. e.g. i.e. Elem. Anal. Ed. or Eds.
etc. et al. ibid. vs.

Sound out the letters of acronym to choose the articles *a* or *an*:

an NMR (en- sound) an MS (em- sound) an MIP

Use proper characters

Chemical shift should use δ .

^1H NMR (CDCl_3 , 300 MHz) δ 2.34 (s, 2 H), 5.43 (d, $J = 2.4$ Hz, 1 H), 6.24 (dd, $J = 2.4, J = 8.3$ Hz, 1 H), 7.23 - 7.45 (m, 4 H), 12.02 (br s, 1 H)

Other places to use Greek letters and odd symbols:

$\lambda_{\text{max}} = 265 \text{ nm}$ α -carbon is acidic $1 \text{ nm} = 10 \text{ \AA}$

π -stacking σ -bond or π -bond

Do not use vague words or phrases

Be as specific as possible

avoid using the word: **it**.

better: Specify what "it" is. Use the noun instead of "it".

try to **avoid** using the word: **this, these, or those**.

if you use "this", have it followed by a noun or name.

try to **avoid** using the word: **etc, and more, and so on**.

avoid contractions: **can't, isn't, doesn't**

better: Cannot, is not, does not.

“Verbing” a Noun:

It is better not to turn words that are usually nouns into verbs.

original: Ammonia **complexes** to cobalt ions .

better: Ammonia **forms complexes** with cobalt ions.

original: The mixture was **centrifuged** to separate the solid.

better: The solid was separated from the mixture **using a centrifuge**.

original: The solution was **rotovapped** to dryness

better: The solvent was **removed by rotary evaporation**.

original: The reaction mixture was **refluxed** for 10 h.

better: The reaction mixture as **heated at reflux** for 10 h.

chemistry.kenyon.edu/hofferberth/Research/Chem233Resources/ABRIEFGUIDETOWRITINGINCHEMISTRY.pdf

References

Carefully read the author guidelines for the journal or be consistent and follow a specific set of rules

Each journal has specific (but often different) rules on how to write the reference: in (), in [], superscript, (author and year).

Each journal has specific (but often different) rules on the order and format of the: authors names, journal, year, volume, page number(s)

Reference numbers usually go **after** punctuation (comma, period, semicolon).*

Do not list the same reference twice. Use a cross-reference.

Grammar rules for the articles: “the” and “a”

Grammar rule 1

When you have a single, countable English noun, you must always have an article before it. We cannot say "please pass me pen", we must say "please pass me **the** pen" or "please pass me **a** pen" or "please pass me **your** pen".

Nouns in English can also be uncountable. Uncountable nouns can be concepts, such as 'life', 'happiness' and so on, or materials and substances, such as 'coffee', or 'wood'.

Grammar rule 2

Uncountable nouns don't use 'a' or 'an'. This is because you can't count them. For example, advice is an uncountable noun. You can't say "he gave me an advice", but you can say "he gave me **some** advice", or "he gave me **a piece of** advice".

Some nouns can be both countable and uncountable. For example, we say "coffee" meaning the product, but we say "a coffee" when asking for one cup of coffee.

Grammar rule 3

You can use '**the**' to make general things specific. You can use '**the**' with any type of noun – plural or singular, countable or uncountable.

"Please pass me **a** pen" – any pen.

"Please pass me **the** pen" – the one that we can both see.

"Children grow up quickly" – children in general.

"**The** children I know grow up quickly" – not all children, just the ones I know.

"Poetry can be beautiful" – poetry in general.

"**The** poetry of Hopkins is beautiful" – I'm only talking about the poetry Hopkins wrote.