

# Scientific Writing

The image shows a standard periodic table of elements. The title "Scientific Writing" is written in a large, bold, black font across the middle of the table. The elements are arranged in their usual order, with atomic numbers and symbols visible. The lanthanide and actinide series are shown as separate rows at the bottom of the main table.



## Scientific Communication – Resources

<p>ACS Style Guide – Janet Dodd (2<sup>nd</sup> or 3<sup>rd</sup> edition)</p> <p><a href="http://pubs.acs.org/books/references.shtml">ACS Online Reference Style Guidelines</a> <a href="http://pubs.acs.org/books/references.shtml">http://pubs.acs.org/books/references.shtml</a></p> <p>ACS Scientific Writing Resources on the Web: <a href="http://www.chemistry.org/portal/a/c/s/1/acdisplay.html?id=e5cada7e8b6b11d5f7eb3fba9e800100">http://www.chemistry.org/portal/a/c/s/1/acdisplay.html?id=e5cada7e8b6b11d5f7eb3fba9e800100</a></p> <p><i>How to Write and Publish a Scientific Paper</i> by Robert A. Day Introduction to Journal-Style Scientific Writing <a href="http://abacus.bates.edu/~qanderso/biology/resources/writing/HTWgeneral.html">http://abacus.bates.edu/~qanderso/biology/resources/writing/HTWgeneral.html</a></p> <p><i>On being a scientist: responsible conduct in research</i> Committee on Science, Engineering, and Public Policy <a href="http://books.nap.edu/openbook.php?isbn=0309051967">http://books.nap.edu/openbook.php?isbn=0309051967</a></p> <p><i>On Writing Well : An Informal Guide To Writing Nonfiction</i> by William Zinsser <i>Style: Toward Clarity And Grace</i> by Joseph M. Williams</p> <p>*L.A <a href="http://www.writing.eng.vt.edu/">Writing Guidelines for Engineering and Science Students</a> <a href="http://www.writing.eng.vt.edu/">http://www.writing.eng.vt.edu/</a></p> <p>* * A <i>The Craft of Scientific Writing</i> by Michael Alley</p>	
---	--



### A scientific paper should:

- Present the facts in an unbiased manner
- Be clear: concise and complete
- Use facts to make statements
- Be complete enough that other scientists can repeat your work (research papers)

### A scientific paper should not:

- Be haphazard, jumbled and illogical
- Be used as your own personal soapbox
- Reach conclusions not based on evidence reported
- Be for insiders only



## A Scientific *Review Paper*

A good *review paper* should:

- Bring together published material for the purpose of:
  - Evaluation
  - Discussion
  - Dissemination
  - Tutorial
- Present pertinent facts about the subject
- Be up to date about the progress in the area
- Give some conjecture about the future of the area

Do not present experimental results



## Anatomy of a Scientific Paper

- Title
- Abstract
- Introduction
- Background (Introduction and Background often together)
- Current Research (Results in research paper)
- Future Directions (Discussion in research paper)
- Summary and Conclusions
- References (Bibliography)

\* Actinide series

89	90	91	92	93	94	95	96	97	98	99	100	101	102
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
(89)	(90)	(91)	(92)	(93)	(94)	(95)	(96)	(97)	(98)	(99)	(100)	(101)	(102)



## Organization of a Scientific Paper

- Title
  - Clear definition of what you are talking about
- Abstract
  - Write after the paper is fully written
  - Summary of what the paper is about
- Introduction
  - Very brief, general discussion of the area
- Background
  - General information about the field
  - Bring the reader up to the level necessary to understand the current research section
  - 5-10 papers



- **Current Research**

- Review the current literature in the area
- Organize with sections
- Gives reader a sense of where things are right now

- **Future Trends**

- Where will the field go?
- You can be more speculative with this section

- **Conclusion**

- Short, not a copy and paste of the current research

- **Bibliography**

- Organized and formatted correctly

\*\* Actinide series

Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
89	90	91	92	93	94	95	96	97	98	99	100	101	102



### Title

- The *fewest* words possible that cover the purpose of the paper
  - A. Einstein, "Everything should be made as simple as possible, but not simpler."
- NVR. U. ABBRVS. In a TTL. Like OMG. WTF. BBQ.
- Include technique or method (Research Paper)
- Include author's name and affiliation (University of North Florida)

\*\* Actinide series

La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
89	90	91	92	93	94	95	96	97	98	99	100	101	102



## Abstract

- A short paragraph which summarizes the paper
- A good abstract contains:
  - A concise statement that describes the purpose of the paper
  - Includes results and conclusion (specific but not detailed)
  - Is written last
  - Does not include anything that is not in the paper
- For reviews, perhaps include limited citation sources and the scope of the review

Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No
----	----	----	---	----	----	----	----	----	----	----	----	----	----



## Introduction

- Should be a clear statement of the study's objective
- You are introducing the topic:
  - State the relevance of the topic
  - Give the purpose of the paper
  - Include breadth of the coverage
- Mention previous reviews in the same area

\*Lanthanide series

57	58	59	60	61	62	63	64	65	66	67	68	69	70
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb

\*\*Actinide series

89	90	91	92	93	94	95	96	97	98	99	100	101	102
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



## Background

- Define and explain the terms, concepts, and theories necessary to understand the paper
- Be as short and complete as possible
- The background has two purposes:
  - To set up the context for the discussion in the body of the paper
  - Allow a scientist to become familiar with the theoretical groundwork of the subject

\* Actinide series

89	90	91	92	93	94	95	96	97	98	99	100	101	102
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



## Current Research (Results)

- Use sub-titles to organize the material
- Use introductory sentences to keep the reader focused
- Present material in a logical fashion
- Provide details as needed
- Add in comparison and contrast information (if appropriate for paper)

\* Actinide series

89	90	91	92	93	94	95	96	97	98	99	100	101	102
La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



## Future Directions

- Summarize the current direction of the area chosen
- Discuss problems, challenges, and obstacles future research faces
- Predict (based on information) where you think this area of research is headed (or where you think it should be headed)
- Be realistic:
  - We will not all be living on Mars in twenty years
  - Almost everyone does have a computer today

* Lanthanide series	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
** Actinide series	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



## Summary and Conclusions

- Short and sweet (pontification is prohibited)
- Remember your stated objective!
- Summarize the paper (look at your abstract) and state your conclusions
- Don't try to sell your conclusions (the reader has reached their conclusions based on the facts you presented). Incredible claims require incredible proof!
- Try to anticipate and respond to potential questions

** Actinide series	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb
	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



## References

There are three major styles

- **Name and year**
  - These references are placed at the end of the sentence in parentheses (Einstein, 1955)
  - Index is then alphabetical, using years as secondary
- **Italic number in line**
  - Place number in parentheses or brackets at the end of the sentence (34) or [34]
  - Index is in the order of appearance
- **Superscript numbers**
  - These numbers appear at the end of a line after the period.<sup>34</sup>
  - Index is in the order of appearance

Be complete, correct, and consistent



## Acknowledgements

- You did not just win an Oscar (forget about friends and family)
- You may wish to thank
  - Proofreaders
  - Mentors
  - Colleagues who helped
  - Information source?
  - Institution

\*\* Actinide series

89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No		



## Writing Style

- Use short sentences
- Be unambiguous
- Primarily passive voice
  - use active if it is less wordy
- Primarily **past** tense
  - use present tense in results, discussions, conclusions if appropriate
- Avoid first person singular/plural wherever possible
  - don't confuse the sentence
- Be gender neutral

\*\* Actinide series

89	90	91	92	93	94	95	96	97	98	99	100	101	102
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



## Other thoughts

- Do a spell check! (even if it may be tedious)
- Don't talk down to the reader
- Avoid blather (BS)
- Do not plagiarize
  - **taking parts of sentences or complete sentences directly from papers**
  - use quotes if necessary and cite work. (*use very sparingly*)
- Have someone else critically read the paper

\*\* Actinide series

89	90	91	92	93	94	95	96	97	98	99	100	101	102
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No



## Proofreading

- Content, grammar, spelling, format
- Use proofreading marks
- Check for words like from(form), there (their)
- Capitalization
- Read a sentence and identify if it says what you meant it to say
- Spell check! (It's free)

* Lanthanide series	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb
* Actinide series	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No



## Plagiarism

PLAGIARISM: Intentionally or knowingly presenting the work of another as one's own (i.e., without proper acknowledgment of the source). The sole exception to the requirement of acknowledging sources is when the ideas, information, etc. are common knowledge.\*

55 Cs	56 Ba	57-70 *	71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89-102 * #	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Uun	111 Uuu	112 Uub	114 Uuq					

* Lanthanide series	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb
* Actinide series	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No

\* [http://www.unf.edu/registrar/forms/misconduct\\_policy.pdf](http://www.unf.edu/registrar/forms/misconduct_policy.pdf)

