

Writing a Journal Article

The primary method by which scientists communicate important results is through articles published in professional journals. In the next semester you will get a chance to submit an article, to a journal published here at Hunter College, on an experiment you have designed, performed, and analyzed. Well before that you will be asked to submit your lab reports in journal article format, rather than the expanded lab notebook format you used in Core 1.

So what is “journal article format”? In essence, the goal of a journal article is similar to the goal of a poster presentation: to communicate the purpose, process, results, and interpretation of an experiment (or theory) to fellow scientists. In form, the journal article is written in complete sentences and paragraphs, much like the papers you write for other classes. Often, the content is divided into short sections. We strongly recommend that you look at actual journal articles; the Hunter College library stocks journals on a wide variety of topics. The following points are important to keep in mind when you are writing in journal article format:

—In style, the article should be more like an English paper than a math exam. In other words, use paragraphs and complete sentences, and always try to maintain a “flow” from start to finish. Never write as if you are answering a series of arbitrary questions. For help with the style, grammar, and flow of the paper, consider bringing it to the Writing Center (located in 416 Thomas Hunter). Although the staff there may not be familiar with the science, they can certainly help you with the writing.

—The article should be fairly short and to the point. Although it should contain all the necessary information, it should not contain overwhelming amounts of detail. Remember that you are writing for a fellow scientist.

—The article must be in your own words. In an English class, many students may write a paper on the same book, but their papers are different. Likewise, even though everyone in your class has performed a similar experiment, your article will be different, even from your lab partner’s.

For the purposes of Core, an article consists of the following:

Title: The title should emphasize the focus of the experiment. It does not have to reveal the conclusion, although it may. It should not be “cute.” It should not be identical to the name of the lab in the lab manual. Examples of good titles:

“A Determination of the Percentage of Zinc in Two Compounds by EDTA Titration”

“An Experimentally Determined Formula for the Buoyant Force of Water”

Your Name: On a line below the title.

Abstract: An abstract is a short summary of the article. It should be a paragraph in length, and should summarize the experimental technique, results, and interpretation. It is set off from the rest of the article and headed by the word “Abstract.” (Look at actual journal articles to get a

better idea.) Abstracts serve a couple of purposes: they allow readers to decide whether they want to read the rest of the article, and they provide a summary of the article for use in online databases, quick identification, and the like.

After the abstract, the article itself begins. You may label these sections separately, or leave the labels off, as you prefer.

Introduction: The article itself begins here. What you include in the introduction is up to you, except that anything you include must help “motivate” the experiment. That is, explain why the experiment was worth performing. The introduction, unlike the abstract, should not include any results or conclusions. Use the focus questions as a guide, but don’t just repeat them. Some examples:

—A previous experiment may have raised some additional questions. Briefly mention the results of the previous experiment and how they lead to the current investigation.

—Theory may make a startling prediction or perhaps be unclear on what would happen in a given situation. Briefly explain how the theory relates to the experiment you decided to perform.

—The experiment might help solve a “real-world” problem. Explain how.

—Perhaps the simplest introduction is for an experiment performed out of scientific curiosity. Simply give the purpose of the experiment and how it fits into the larger scientific framework you are learning.

It is important to realize that the abstract and introduction perform different functions. The abstract is a summary of the article: everything in the abstract must also be in the article somewhere. In other words, the article should be complete without the abstract, and the abstract should make sense without the article. The introduction, on the other hand, just gives a motivation for the experiment.

Experimental Method: Describe how the experiment was performed. Do not give a step-by-step procedure. In other words, say things like “A sample of zinc iodide was prepared by heating a solution of zinc, iodine, and acidified water until all the water had boiled away.” If you used any special or innovative techniques, mention them here. In some experiments, for example, you are required to maintain a sample at a constant temperature. Be sure to explain how you achieved the constant temperature.

Results: Present your data in an easy-to-interpret form (graphs are good). Do not include large amounts of “raw” data in the article; attach any raw data to the end of the article as an appendix. Describe any calculations you made in detail: why was the calculation performed? How is it done? (A formula or sample calculation would be a good idea.) What were the results? (Again, a graph or table is often a good way to do this.)

Analysis and Conclusions: You should certainly discuss the quality of your data at some point. (How did you decide which data was good? Was some of it better or worse than the rest? What might have caused problems with the data?) You should also interpret the results.

In some experiments, that means transforming graphs into functional relationships (equations). In others, it means giving a microscopic description of what occurred. In all cases, you should make sure you have answered the focus questions. Of course, don't say "the answer to the focus question is..." The answers to the focus questions should flow naturally out of your analysis. Finally, suggest what form additional research on the topic might take. This is, of course, just a "What IF" question, but again, work it into the article itself. For example: "In this experiment, we attempted to minimize the role of friction, in order to allow the results to be more easily interpreted. It would be interesting to repeat these experiments with a high-friction system, such as a wood block sliding down a wooden ramp, to see how the results might differ."

Endnotes: At the end of the article, list any sources you may have used to help you write the article. This could include, for example, your textbook or a chemical handbook. You should definitely include the names of any other students you worked with. For example, you might have a sentence like this within your article: "Others who performed similar experiments got similar results, although in many cases the acceleration was hard to determine¹." Then, at the end of the article, you would have an endnote like this: "¹Data provided by Stacy Rivera, Alan Chan, Cassandra Robertson, and Michael Cohen."

Appendix: Your raw data. Unlike the rest of the article, it is acceptable if this is a photocopy from your lab notebook.

A few other notes:

—Equations should always be on a separate line, and should be numbered, like

$$F = ma \qquad (5)$$

—Tables, graphs, and figures should be numbered. In the article, they should be referred to by number. If you do this, you can just include the graphs and tables as separate sheets at the end of the article. Please don't go to the trouble of trying to put these things on the same page as the text. Yes, it does look that way when it's finally published. But in general the scientist who writes the article submits it to the journal with the graphs and tables at the end.

—Keep the article short. A few pages of text is good for a one-week lab.

—Articles must be typed. Unless your spelling is very good, run a spell check on the document. This will be a little annoying, since most spell checkers will think equations and chemical formulae are misspellings, but it is still a good idea.

—Don't waste a lot of time trying to make tables and figures look "pretty." For an actual article, like the one you'll write in Core 4, this is a necessary, but time-consuming, part of the process. Just make sure this kind of thing is neat, legible, and correctly labeled (title, units, headings, etc.).

Right now this all may seem a little intimidating. Here are a few pieces of advice to make it easier:

—Realize that the sections of an article are almost the same as the sections of a poster. In terms of the science, you don't have to do anything new. The only significant new piece is that now everything has to be written in sentences and paragraphs.

—Previous students have suggested that we leave the post-lab questions in the lab manual, even for labs in which you will use an article format. You do not need to answer all of these post-lab questions in your article. Nevertheless, they should help you with analyzing the data. By the way, you must still keep a lab notebook, but again, it does not need to have post-lab questions, conclusions, etc. in it. Once you begin writing in article format, your notebooks have to have only data, observations, and whatever else you find useful.