

How to read a journal article

This guide will help you read and understand journal articles. It explains how they are structured, where to find specific information, what peer review is and how you can critically assess the content.

Why read journal articles?

Journal articles are one of the main ways in which scientists communicate their most recent research to the scientific community and are a good source of information. At first reading journals can seem challenging; they are written for an expert audience in a formal style and follow a certain structure, which may be unfamiliar. It's worth spending the time learning how to read them though, as it's a skill that will come in handy whether you're writing up laboratory reports, literature reviews or project dissertations.

Showing that you've read and understood journal articles by discussing and referencing them in your work can help improve its quality, as well as highlighting to your tutors your level of understanding and the research you've done.

Journal articles: how they are structured

Articles in academic journals usually follow a standard format and are divided into various sections. The name and order of these sections can vary from journal to journal and across subject disciplines, but understanding how an article is constructed will help you quickly locate the information you need.

You don't need to read an article in the order in which it's presented and, depending on the type of information you need and the level of detail required, you may not need to read every section. It can be useful to read the abstract and conclusion first and then look at any diagrams, structures and figures.

Title: Tells you what the article is about

Author and institution: Tells you how many authors there were, who they are and where they work. From this you can find out if any of them are known experts in the field and if their institution is internationally recognised.

Abstract: A short summary which will often include why the study was conducted, the methods used and the key results or findings.

Introduction: Provides some context and background information about the topic, including details of other research in this area with references to other relevant articles. The aims and goals of the study should also be outlined; what questions will it answer, how do the findings contribute to the understanding or advancement of knowledge of the subject. Overall the introduction should fully justify why the research was conducted.

Results and Discussion: A presentation of the findings and the authors' interpretation of their significance and how they relate to existing research in this field. Data are often presented as graphs, spectra, equations, tables, plots, structures and reaction schemes.

Experimental: Describes the experimental techniques and procedures used. These descriptions should be detailed enough to allow other researchers to replicate them. In some journals this section may be called Materials and Methods.

Conclusion: Often summarises the details from the Results and Discussion that the authors wish to highlight, or feel are the most important. Some journals may incorporate the Conclusions in the Discussion section.

References: Lists details of the sources cited in the article. Helpful for finding related literature on the subject.

What is Supplementary information and why is it useful?

When reading journal articles you may find references to something called Supplementary information or Data. If you found the article online there will be a link which will take you to this material. If you're reading a printed copy there should be a note in the text which tells you that Supplementary information is available. This can be hard to spot as, depending on which journal you're reading, details may be found in different sections such as a footnote or at the end of the article after the references.

Authors include material in the Supplementary information which they believe to be of interest but which cannot be accommodated in the main journal article. This may be due to a lack of space or because of the material's format, as with 3D models, videos, animations and data sets.

Once you've established that the article has Supplementary information you need to decide if it will be useful for you to view it. The Supplementary information generally shouldn't include anything which hasn't been mentioned in the original article and it isn't essential for you to read it – although there can be exceptions to this with certain types of journal articles. But you may be interested to see more results in their original form, rather than just those the author has selected and interpreted in the main text. You might even be able to download raw data and run your own analysis on them, although access to specialist software may be required to do this.

Media such as video or 3D modelling might help you to understand difficult concepts as they can be presented in a different way.

Peer review – what it is and why it's important

The journal articles you read are likely to have gone through the peer-review process prior to being published. This process involves reviewers - who are researchers and experts in this field - evaluating the research. They look at the experimental methods and procedures used, and check the validity of the conclusions and how the results have been processed and interpreted. They must also decide if the study is of value and worth disseminating to a wider audience.

Often the reviewers will suggest changes the authors must make if the article is to be accepted for publication. The aim of peer review is to maintain and improve the standard of published research. Articles in peer-reviewed journals are generally considered to be of high quality.

Critiquing articles – why you should critique articles and how to go about it

Why critique articles?

If an article has undergone the peer-review process you might assume that you can simply accept the findings as correct. However, one of the skills of a good scientist is the ability to think critically and ask questions about the study. The process of critiquing articles will help with your subject knowledge, as it's hard to come to conclusions about the procedures used and interpret the findings if you don't understand what you're reading. You may need to learn more about the subject before you feel confident enough to critique the article.

How to critique an article – the questions to ask and where to look for the answers

You'll need to read the article in depth in order to critique it, so it's a good idea to skim through it at least once and look up any terms or processes you don't understand before you move on.

The aim of critiquing is not necessarily to disprove the authors' conclusions or find errors in the results, although this can sometimes happen. The intention is to evaluate the study and the manner in which it's presented. The impact of exciting and useful discoveries can be obscured in a poorly written article which lacks clarity. While reading, consider if there are ways in which the article can be improved.

- Did you find the information you expected in specific sections?
- Were the results presented clearly and could they be easily understood?
- Were you convinced by the authors' interpretation of the results?

Use the questions below to help you think critically as you read. If the article is well written and the science well done you should be able to find the answers relatively easily in the suggested sections.

Why is this study important? What is the objective?

Read the Abstract and the Introduction to find out; look for:

- an explanation of the purpose of the study; what it aims to achieve, the problem or issue it seeks to resolve;
- the significance and relationship of the study to the existing body of research in this subject; and
- references to relevant literature on the topic.

What was the authors' overall plan?

Read the Introduction to find out; look for:

- description of the methods and techniques to be used; and
- justification for why these have been selected as opposed to other options.

What was the authors' procedure?

Read the Experimental, the Results and Discussion and/or the Supplementary information to find out; look for:

- description of the methods and techniques employed which include sufficient detail to allow replication by others;
- relevant figures which are legible, appropriately labelled and in context; and
- convincing and credible interpretation of the data.

What are the conclusions?

Read the Discussion and Conclusion to find out; look for:

- clear summary of the findings supported by evidence;
- details of what the study accomplished;
- whether the conclusions are justified by the results; and
- that there are no flaws in the arguments.

What are the next steps?

Read the Discussion and Conclusion to find out; look for:

- suggestion of further research, why it's required and what it should achieve; and
- details of any practical applications of the findings.

Like all things, reading and critiquing articles will become easier with practice. The [Journal articles made](#) easy series on Learn Chemistry are designed to develop the skills you need to read and understand journal articles with confidence.