

Paper Format- what goes where?

Abstract-

A little of everything, the 250 word trash can

Define problem- why is it important and a little background

Background

Purpose of the experiment/ Hypothesis

How you did it/ how will you study your phenomena (methods, techniques)

Quantitative results- what you found

Interpretations and implications- what it means (conclusion)

Contextualize how your results relate to the problem defined at the beginning (takeaway)

Give readers a reason to read the paper!

Introduction-

First paragraph is a funnel: big picture (why should tax payers care) → area of study

Statement of problem or purpose

Why do the study? Describe the problem and why anyone should care

Background- literature review of relevant background material

How has problem has previously been explored

What theory/theories are currently used to explain or model the phenomena

Carefully review the most closely related studies

Overview of less closely related studies

Review application of techniques you will use to similar problems

Structure background material so what you propose is an obvious next step

Highlights need for additional study

Last paragraph- say how you will address the hole in the literature

State your hypothesis- should derive clearly from lit review

Materials and Methods-

Be sure to provide enough detail that anyone with the skill could replicate the experiment.

Chopped down and streamlined procedure

What you used- chemicals (manufacturer, lot); instruments (make, model, manufacturer, location); glassware (specify material)

Specify replicate measurements, calibration procedure, quality controls (SRM)

How you did the experiment- so others can replicate and evaluate the data

Reference the method you used (from literature) with any modifications

Description of sample site, if appropriate

Instrument identity, procedure, instrument or experiment parameters

Any necessary equations

Number replicate measurements

Sample preparation

Data reduction and analysis methods and software

Statistical treatment of data

Results-

No raw data, no interpretations

What you found

Introduce and summarize tables and graphs with captions and titles

What your data says with minimal interpretation

Gloss over interpretation- only have it if it is the critical link between two analysis

What the figures tell you

Your observations of the data
Reduced data with estimation of errors and statistics
Reference figures and tables in text
Information presented in the same order as Materials and Methods

Discussion-

Summarize findings quickly
Did the experiment work?
Then start pulling ***explanations or interpretations*** out of the data/ figs/ tables
Problems encountered in procedure/technique and anticipated effect on data/ results
Attempt to explain weird results
State the largest source of error in the experiment and discuss how it could be minimized.
Are your results similar or different from previous studies or expectations?
If you used multiple techniques, were the results consistent between them?
Evaluate competing ideas/theories that could or could not be ruled out
Limitations of technique or method or instruments used
Did experiment work? Why or why not?
Explain why findings either match or don't the hypothesis
Interpret results within the context of the background material
Explain findings in the context of the background material presented in introduction
Future directions
Organize around ideas rather than techniques

Conclusion-

Complement to abstract
Briefly state what you did and why it was important
Revisit purpose/ hypothesis
Drives home the main findings
Call to action/ Show relevance to field or public
Potential future directions

Acknowledgements-

Who helped you, what did they contribute?

References- Endnote?

If you didn't think of it, cite it!

Specific to CHEM 314 reports:

Big picture ideas:

Is there anything toxic in your product?
Is the product as advertised?
What are the human or environmental health implications of exposure to these ingredients?
Testing efficacy or application of technique to your system

Ingredients, packaging:

What is in your product (ingredients) or what types of compounds are typically found in this kind of product

Instrumental techniques (addressed in instrument section)

What instrument/method you are using to measure it- is this the best or only way to measure it? How does the instrument work?