

Review of the first edition of

Chemistry (OpenStax)

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Reviewer Information

Textbook that was reviewed
Chemistry: OpenStax
For what level would this textbook be appropriate?
First Year
My name
Devin Latimer and Josh Hollett
My title/position
Lecturer
My institution
University of Winnipeg

Comprehensiveness

The text covers all areas and ideas of the subject appropriately and provides an effective index and/or glossary.

The reviewers generally find this book to be a suitable resource of good quality that covers the majority of important concepts for an introductory university chemistry course. What follows are comments or suggestions for each individual chapter:

Chapter 1 - Essential Ideas

Nice introduction to Chemistry and its history.

- [?] Domains of Chemistry

- [?] With the advent of computational chemistry we do not have to visit the microscopic only in our mind.

- [?] Figure 1.16 could do with a little more explanation, or at least a reference to the electrochem chapter.

- [?] 1.4 Author's avoid using units with negative exponents in place or "per" (e.g. g/L), even though they discuss dimensional analysis (which naturally lends itself to using exponents on units). This becomes more obvious when they resort to exponents in the kinetics chapter (Chapter 12)

Chapter 2

Good introduction to chemistry fundamentals.

Chapter 3

Good introduction to chemical quantities.

Chapter 4

Good coverage of stoichiometry.

Chapter 5 - Thermochemistry

Very well explained concepts. This material is presented at a fairly elementary level and the text will be an especially good resource for intro chem students who struggle with the material.

Great job on calorimetry.... very well explained with large pictures and multiple examples.

Conspicuously, there is no section on the use of tables of average bond energies for calculating a reaction energy change, which would normally be found in a chapter such as this.

There is an adequate number and variety of end-of-chapter problems.

Chapter 6 - Electronic Structure and Periodic Properties of Elements

Thorough discussion of the basics of electromagnetic radiation, very good on properties of emR and use of examples such as transmitters. Very thorough and basic introduction to electron configurations and periodic properties, but more examples of the exceptions of each could be presented.

Chapter 7 - Chemical Bonding and Molecular Geometry

Well explained but fairly thin on Ionic Bonding section - More details on the ionization of elements and examples of ionic compounds should be introduced.

Covalent bonding is fairly detailed and introduced in a very elementary fashion. Weaker students should find these sections helpful. Sufficient detail on Lewis structures of elements and molecules as well as the calculation and use of formal charges. A few more examples involving resonance of larger molecules would be appropriate.

The section on Ionic Bond Strength and Lattice Energy is weak, and could especially use some more schematics. I believe students that are unfamiliar with this concept would struggle with only this as a resource.

Good introduction to section 7.6 Molecular Structure and Polarity, but pictures of the geometric shapes of a tetrahedron, trigonal bipyramid and octahedron could be inserted into Figure 7.16 for more clarity. I.e. Figure 7.20 (a) shows the picture of a trigonal bipyramid.... Why not show this earlier when the student is learning the basic shape?

Chapter 8 - Advanced Theories of Chemical Bonding

Well written chapter. Covered the minimum that would need to be discussed in intro chem.

Chapter 9 - Gases

Coverage of gases is as good as, or better than, other first year texts.

- [?] If Effusion and Diffusion are a separate topic, why not put it before the kinetic molecular theory of gases?

Chapter 10 - Liquids and Solids

Good coverage of intermolecular forces, states of matter and phase changes. Maybe a little thin on the detail around enthalpies of fusion, vaporization ,etc. But likely sufficient for most first year courses.

Chapter 11 - Solutions and Colloids

Decent coverage of solution formation and their properties, and colloids. Unfortunately, there is no quantitative discussion of the energetics of solution formation (i.e. enthalpies of solution)

Chapter 12 - Kinetics

Good introduction to chemical kinetics, on par with the better texts out there.

Chapter 13 - Fundamental Equilibria Concepts

Adequate intro to basics, good intro to homo and heterogeneous eq., The separate section devoted to equilibrium calculations (13.4) is excellent and a good model for other concepts.

Chapter 14 - Acid-Base Equilibria.

Somewhat lacking in the definitions in that there is only a brief mention to an earlier discussion of Arrhenius acids and bases (with no specifics on where that earlier discussion is) and no mention of Lewis acids and bases. Confusingly, a section on Lewis acids and bases is found in the next chapter rather than this one. Excellent detailed step-wise solutions to problems.

Chapter 15 - Equilibria of other Reaction Classes. Interesting examples such as oceans and photography.

Chapter 16 - Thermodynamics

Good, but section 16.4 Free Energy discussions on Gibbs energy seems somewhat light compared to other texts.

Chapter 17 - Electrochemistry

Good introduction to electrochemistry, all the fundamentals are included.

-❑The author's use of a multiplication sign in the final equation of the chapter is a bit puzzling.

Chapter 18 - Representative Metals, Metalloids, Nonmetals

Good introductory survey of main group chemistry.

-❑The use of the term "representative" appears to be out of touch with modern terminology (why not "main group"?)

Chapter 19 - Transition Metals and Coordination Chemistry

Good introduction to transition metal chemistry.

Chapter 20 - Organic Chemistry

An adequate introduction to some organic functional groups with some basic organic chemistry and an intro to plastics and biochem along the way.

Chapter 21 - Nuclear Chemistry

I appreciate the OpenStax introduction to nuclear binding energy ahead of radioactivity as opposed to discussing radioactivity first which is common in other texts. Excellent introduction to radiometric dating.

Appendices

The usual collection of appendices. Nice section on Essential Mathematics.

How do you rate the book's overall comprehensiveness?

4

Content Accuracy

Content, including diagrams and other supplementary material, is accurate, error-free, and unbiased.

Yes.

Overall, how do you rate the accuracy of the content?

5

Relevance/Longevity

Content is up-to-date, but not in a way that will quickly make the text obsolete within a short period of time. The text is written and/or arranged in such a way that necessary updates will be relatively easy and straightforward to implement.

Yes.

Overall, how do you rate the relevance/longevity of the book?

4

Clarity

The text is written in lucid, accessible prose, and provides adequate context for any jargon/technical terminology used.
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Yes.

Overall, how do you rate the clarity of the book?

4

Consistency

The text is internally consistent in terms of terminology and framework.
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Yes.

How do you rate the overall consistency of the text?
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5

Modularity

The text is easily and readily divisible into smaller reading sections that can be assigned at different points within the course (i.e., enormous blocks of text without subheadings should be avoided). The text should not be overly self-referential, and should be easily reorganized and realigned with various subunits of a course without presenting too much disruption to the reader.

Yes.

Overall, how do you rate the modularity of the text?
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4

Organization/Structure/Flow

The topics in the text are presented in a logical, clear fashion.

Yes.

Overall, how do you rate the organization/structure/flow of the text?

4

Interface

The text is free of significant interface issues, including navigation problems, distortion of images/charts, and any other display features that may distract or confuse the reader.

In the online text, refer to each individual figure individually in the text rather than only identifying them through a link. For example, replace "Figure" with "Figure 6.1" in the section 6.1 Electromagnetic Energy text "As can be seen in Figure, the wavelength is the distance between two consecutive peaks or troughs in a wave (measured in meters in the SI system)." The in-chapter examples have captions at the top that indicate what the problem is about which will be very useful for later perusal to find a specific example.

Overall, how do you rate the textbook's interface?
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3

Grammatical/Spelling Errors

The text contains no grammatical or spelling errors.
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Yes.

How do you rate the grammar and spelling of the text?

5

Diversity and Inclusion

The text reflects diversity and inclusion regarding culture, gender, ethnicity, national origin, age, disability, sexual orientation, education, religion. It does not include insensitive or offensive language in these areas.
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Yes.

Overall, how do you rate the diversity and inclusion of the text?

5

Recommendation

Do you recommend this book? If not, why?
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The reviewers generally find this book to be a suitable resource of good quality that covers the majority of important concepts for an introductory university chemistry course. We recommend this book.
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