Review of the first edition of

Chemistry (OpenStax)

Date submitted
2019-03-19 15:28:47

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. Ie. 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.
- 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

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?
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### Grammatical/Spelling Errors

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### Recommendation

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