Preface

Notes on General Chemistry, 2e

I took your class last year for both semesters.
I am reviewing chemistry for the MCAT's and such and
whenever I want a more detailed explanation of
what exactly is going on or a new perspective on things, I go to your notes.
Your notes are very helpful because they explain why everything is the way it is, …
Email from Eliran Bracha, Boston University student, June 25, 2006

This is a set of notes on general chemistry at the introductory college level. The notes have been developed from lectures in the year-long general chemistry course CH101/2 at Boston University. They are at the level of the texts such as *ACS Chemistry* (WH Freeman), *Principles of Chemistry* by Munowitz (Norton), *Principles of Modern Chemistry* by Oxtoby, Gillis, and Nachtrieb (Thompson Learning), and *General Chemistry* by Petrucci, Harwood, and Herring (Prentice Hall).

The broad subjects covered in the notes are listed below.

Chapter 1, The stuff of chemistry

Chapter 2, Quantum aspects of light and matter

Chapter 3, Quantum picture of atoms

Chapter 4, Quantum picture of molecules

Chapter 5, Properties of gases

Chapter 6, Condensed phases

Chapter 7, Chemical equilibrium

Chapter 8, Acid-base equilibria

Chapter 9, Precipitation and complex ion equilibria

Chapter 10, Energy balance: First law of thermodynamics

Chapter 11, Spontaneity: Second law of thermodynamics

Chapter 12, Electrochemistry: Harnessed spontaneity

Chapter 13, Kinetics: Under the covers of chemical change

Appendix 1, Significant figures in numerical calculations

Appendix 2, Approximating with logarithms

Appendix 3, Rises and runs, slopes and sums: tools from calculus

Appendix 4, Guide to *Mathematica*

Study problems are included throughout the notes. These problems are meant to be done at the point that they appear, to help you assess whether things are clear.

Throughout the notes Mathematica is used to do calculations and to display graphical information. Mathematica is an extraordinarily powerful system for doing mathematics on a computer. A guide to the way in which Mathematica is used in these notes is given in an appendix. You do not need to understand how to use Mathematica yourself, but it will probably make these calculations easy to follow if you read over the guide.

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We teach our students to learn to estimate solutions to numerical problems, correct to one or two significant figures, without using calculational aids, and calculators are not used on exams. Students report, after several weeks of familiarization with this approach to numerical calculations, that not having to rely on calculators allows them to focus more directly on the concepts of the problems they are working with. Knowing how to use logarithms in numerical calculations is particular powerful in this regard. Guides to significant figures and to approximating logarithms is given in an appendix.

Sometimes we will want to explore how a quantity changes as a condition is varied. Calculus was invented to do just this. We certainly do not need the full machinery of calculus, just a few of its key ideas and tools, and these are collected in an appendix. If you are not yet familiar with calculus, the ideas and tools presented in the appendix are all that you need (and a bit more!) to appreciate their application in general chemistry. They may even make your future study of calculus easier.

I hope very much that these notes are helpful, and I will be grateful to receive any questions, comments and suggestions you may have, at dan@bu.edu.

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