Preface
Notes on General Chemistry, 2e

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.
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 particularly 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.