

Chemistry

for the IB Diploma

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Introduction

This book is designed as a complete guide to the IB Chemistry courses at both SL and HL. The book contains all the material required for the main part of the SL and HL courses and the CD-ROM contains the full text of the book in PDF format as well as the Options material (required for Paper 3). Also included on the CD-ROM are a comprehensive guide to Internal Assessment (writing up practical work) and a revision checklist.

Chemistry is about understanding and not just recalling facts, and the emphasis throughout the book and CD-ROM is on explaining the concepts involved in the course. At this level Chemistry should make sense and, hopefully, as you work your way through each chapter you will feel confident that you have fully grasped all the material.

Each chapter is divided into sections which include assessment statements as starting and reference points. Short-answer questions appear throughout the text so you can check your progress and make sure that you have fully understood what has been discussed. There are also links to interactive questions on the CD-ROM, which you can use to further test yourself, as well as animations and simulations that will help you gain a deeper understanding of the concepts. You can link straight through to these features by clicking on the CD icons in the PDF version of the book.

Examination style questions appear at the end of each chapter; these could be used either when you have finished studying a chapter or towards the end of the course when you are preparing for the exams. Overall in the book and the CD-ROM there are well over 1000 questions, so there should be plenty of opportunities to practise all aspects of the course. Answers to all questions are given on the CD-ROM.

How to use this book

Sections that cover material from the Higher Level syllabus only are marked with an 'HL' bar:



As you read this book you will see that certain features are shown in different coloured boxes.

At the start of each section you will find a list of learning objectives, detailing what you will be expected to know after studying the section. The learning objectives are derived from the assessment statements in the syllabus.

Ions are charged particles, which are formed when atoms lose or gain electrons.

Throughout the text, key fact boxes (left) inform you of key definitions and other facts that you should memorise, while info bars (right) give additional information on various subjects related to the text.

Theory of Knowledge (TOK) boxes are also found throughout the book. These provide food for thought and support the TOK you will studying in your IB Diploma programme.

Learning objectives

- Understand what is meant by hybridisation
- Predict the hybridisation of an atom in a molecule

Again, a consideration of the formal charges on each atom would regard this structure as less likely.



There are various theories of acids and bases. We have encountered the Brønsted–Lowry and Lewis theories.

As you read, you will also see 'test yourself' questions at various points in the text, usually at the end of a section. These will allow you to keep a check on your progress as you work through each chapter.

Test yourself

- 1 Give the number of protons, neutrons and electrons in the following atoms:
 ${}_{92}^{238}\text{U}$ ${}_{33}^{75}\text{As}$ ${}_{35}^{81}\text{Br}$
- 2 Give the number of protons, neutrons and electrons in the following ions:
 ${}_{20}^{40}\text{Ca}^{2+}$ ${}_{53}^{127}\text{I}^{-}$ ${}_{58}^{140}\text{Ce}^{3+}$
- 3 If you consider the most common isotopes of elements as given in a basic periodic table, how many elements have more protons than neutrons in an atom?

Throughout the text there are boxes that give information about the applications of chemistry, historical references, internationalism or interesting facts related to the topic under consideration.

It was originally thought that all acids contain oxygen, and the names of this element in English, german (Sauerstoff) and several other languages reflect this mistaken assumption.

The CD symbol indicates extra features that are included on the CD accompanying this book. These include animations, extra sets of questions, simulations and so forth.



Self-test 1