# Module 1: The Chemical Earth

## The syllabus and the book

Although *Conquering Chemistry Preliminary Course* (*CCPC*) fourth edition covers all the material in Module 1 of the current (2002) syllabus, it takes a slightly different approach in some places.

*CCPC* begins similarly to the syllabus by introducing elements, compounds and mixtures (Syllabus Section 1) then shows that different parts of the Earth are made up of different mixtures and describing some important ones. Methods of separating mixtures are discussed (Sections 1.6 to 1.14). There is then a brief discussion of properties used to identify substances (Sections 1.15 to 1.19). Although this is not specifically mentioned in the syllabus, it is implicit in the early parts of the module. Gravimetric analysis of mixtures is then introduced (Section 1.20).The idea that there is a relationship between the reactivity of an element and its likely occurrence in the Earth as an uncombined element is discussed (Sections 1.21 and 1.22). Classification into metals and non-metals is introduced as is the Periodic Table, though the latter is not mentioned in the syllabus at this stage. That makes up Chapter 1.

*CCPC* then combines Syllabus Sections 3 and 5 into Chapter 2 to present a more chemically coherent presentation of atomic structure and chemical bonding and its consequences for properties. After a brief review of atoms, symbols and formulae, the sequence followed is atomic structure (nucleus, electrons, protons and neutrons) (Sections 2.7 to 2.9), electron configuration (in simple form) (Sections 2.10 to 2.13), ionic bonding, covalent bonding, properties resulting from these bonding types, covalent network solids and metals (Sections 2.14 to 2.25).

Syllabus Section 4, basically physical and chemical changes (reactions), is treated in the first part of Chapter 3 (Sections 3.1 to 3.6). The second part is a treatment of formulae and naming of simple inorganic compounds (Syllabus Sections 1, ninth dot point, and 4, sixth dot point).

The way that *CCPC* relates to the HSC syllabus is shown in the *Module 1 and the New South Wales HSC syllabus* tables on pages 90–4.

*CCPC* also includes significant amounts of revision of Stages 4 and 5 material (see below).

For all modules *CCPC* attempts to cover all items in the *Students learn* column, to cover some items in the *Students do* column and to include exercises on as many of the other *Students do* items as possible. Exercises based on experiments are also common.

## Sept/Oct 2002 Syllabus changes

The revised syllabus and/or a version of the original syllabus with the changes marked in it can be downloaded from the Board of studies web site (www.boardofstudies.nsw.edu.au).

*Conquering Chemistry* is still a very close match to the revised syllabus though certain sections and exercises, detailed below, can now be omitted. The first of the two sub-sections below is for students: it tells you what you can omit from *CCPC*. The second sub-section is primarily for teachers: it gives more detail about what the changes are and how they affect *CCPC*.

*In both sub-sections LC, MC and RC mean left, middle and right column respectively and DP means dot point. The references are to the original syllabus (1999 or March/April 2001)*

## 1. For students

As a result of these syllabus changes you should omit the following:

**In Chapter 1**

- You could omit Section 1.5 on page 12, though it is worth reading anyway. However you will not be expected to recall information in Table 1.4.
- Omit Sections 1.21, 1.22 and 1.23 on pages 27 to 31.
  Omit Exercises 27, 28 and 29.
- You could omit Section 1.27 on pages 34 and 35 though it is still a good place to introduce the Periodic Table. You should not omit *Physical states of the elements* on page 36.

**In Chapter 2**

- Although there have been some syllabus changes that affect Chapter 2, I believe that you should not omit any sections of this chapter

**In Chapter 3**

- No omissions from this chapter.

**In Revision Test for Module 1**

Omit Questions 4, 6, 13 and 20. Allow 70 minutes for the test and mark it out of 39.

## 2. For teachers

The changes to the syllabus and their consequences for *Conquering Chemistry* are set out in the following table.

| Syllabus change | Consequence for using *CCPC* |
|---|---|
| **Section 8.2.1** | |
| **In MC** | |
| Delete DP 2 | None |
| Delete DP 4 | Omit Section 1.5 |
| Delete DP 5 | Omit Section 1.23; omit Exercise 29 on page 32 |
| Change DP 9 | None |
| **In RC** | |
| Insert new DP 1 | None |
| Partially delete old DP 2 | None |
| **Section 8.2.2** | |
| **In MC** | |
| Delete DP 1 | Omit Sections 1.21 and 1.22; omit Exercises 27 and 28 on page |

| | |
|---|---|
| Delete DP 2<br>Delete DP 6 | 32<br>None<br>Could omit Section 1.27 though this is a good place for a first introduction to the Periodic Table. |
| **Section 8.2.3**<br>**In MC**<br>Delete DP 2<br><br><br>Insert new DP 3 (after old DP 3)<br>Other changes and the one in RC are 'editorial' rather than substantive | <br><br>Puzzling deletion: students still need to know the basics of atomic structure to understand other syllabus topics<br>Treated in Section 2.9<br>None |
| **Section 8.2.4**<br>**In MC**<br>Delete DP 3, 6 and 7<br>**In RC** delete DP 4 | <br><br>None<br>None |
| **Section 8.2.5**<br>**In MC**<br>Delete DP 2<br><br><br>Delete DP 3<br>Delete old DP 8<br><br><br><br>Insert new DP 8 | <br><br>None (At first sight this may suggest that Table 1.2 on page 7-8 can be omitted, but really that table is there to illustrate mixtures, compounds and elements so still is needed.)<br>Was delayed until Chapter 5 in *CCPC*<br>At first sight could omit Section 2.21 and related part of Table 2.6, but covalent lattices are required in RC DP 2 (and for graphite and diamond in Module 3) so this material is still required.<br>Already in *CCPC* (bottom of page 60) |

## The (original) syllabus and the book

Although *Conquering Chemistry Preliminary Course* (*CCPC*) covers all the material in Module 1 of the original syllabus, it takes a slightly different approach.

*CCPC* begins similarly to the syllabus by starting (Syllabus Section 1) with the idea that different parts of the Earth are made up of different mixtures, describing some important ones, and discussing separation of mixtures (including some gravimetric analysis of mixtures). It then (Syllabus Section 2) looks at the five most abundant elements in the different 'spheres' of the Earth and at the forms in which they occur (Sections 1.21 to 1.23 which now can be omitted), introducing the ideas of constancy of elemental composition and that only non-reactive elements occur in uncombined states (Sections 1.24 and 1.25, still

in the syllabus). Classification into metals and non-metals is introduced as is the Periodic Table. That makes up Chapter 1.

*CCPC* then combines Syllabus Sections 3 and 5 into Chapter 2 to present a more chemically coherent presentation of atomic structure and chemical bonding and its consequences for properties.

Syllabus Section 4, basically physical and chemical changes (reactions), is treated in the first part of Chapter 3. The second part is a treatment of formulae and naming of simple inorganic compounds (Syllabus Sections 1, ninth dot point, and 4, sixth dot point).

*CCPC* also includes significant amounts of revision of Stages 4 and 5 material (see below).

For all modules *CCPC* attempts to cover all items in the *Students learn* column, to cover some items in the *Students do* column and to include exercises on as many of the other *Students do* items as possible. Exercises based on experiments are also common.

For a more detailed comparison of *CCPC* with the syllabus click on
Charts relating C.C. sections to syllabus items**.** These tables show the *Students learn* column of the syllabus (in abbreviated form) along with the sections of *CCPC* that treat individual items.