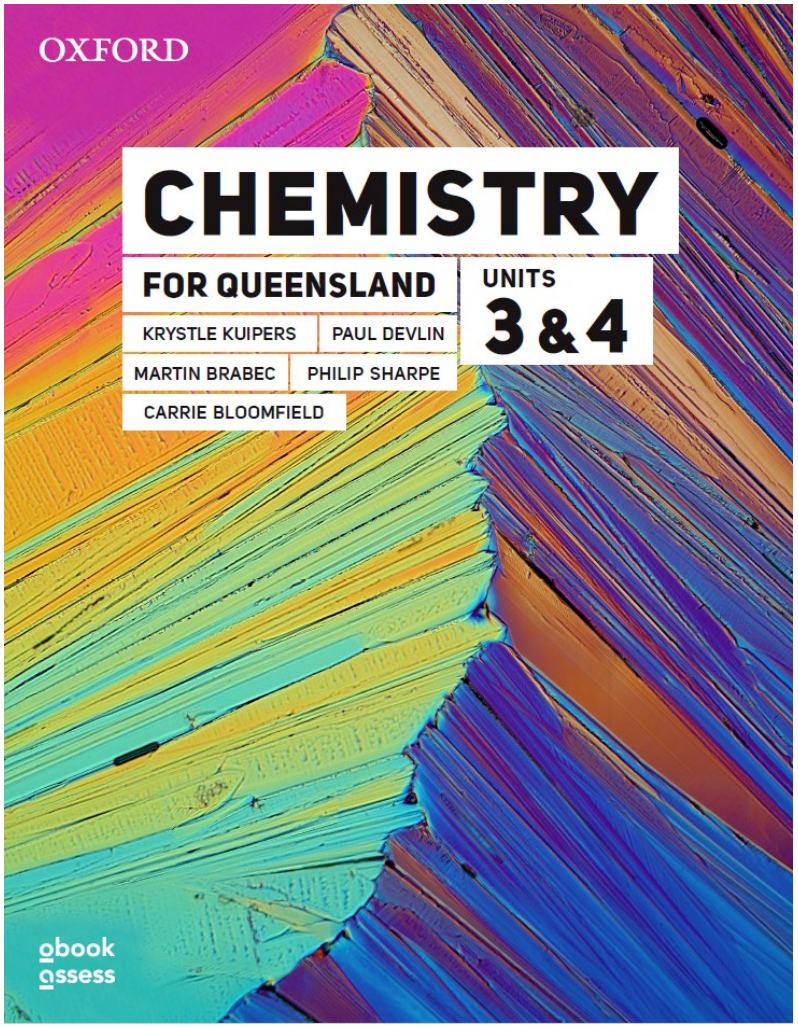


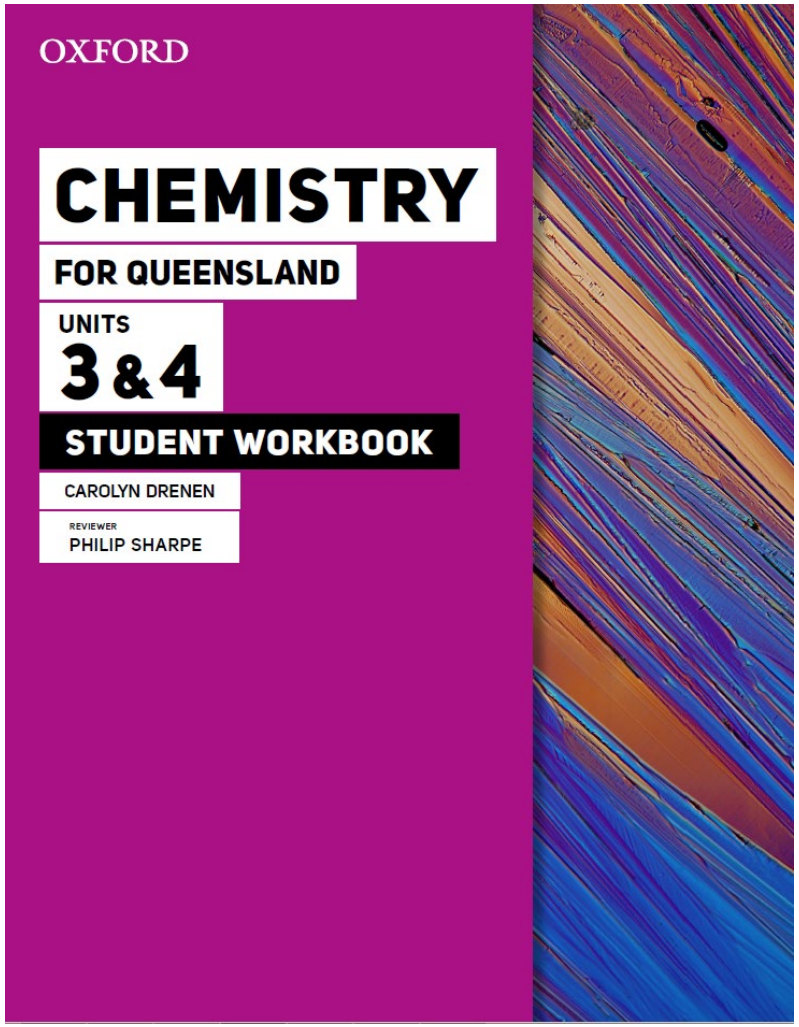

# QCE CHEMISTRY WORKSHOP SERIES

# Are you ready for the new QCAA assessments?

May 2019

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# Welcome to today's workshop

**PART A** Brief overview of Chemistry General Senior Syllabus Units 3 & 4

**PART B** An introduction to Oxford's Chemistry for Queensland series

**PART C** Overview of internal assessment and how Oxford is supporting you

**PART D** Questions and comments

# Meet our authors

**Krystle Kuipers**

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- Chemistry teacher, Head of Science. Previous interstate chemistry exam assessor.

**Series reviewer: Paul Devlin**

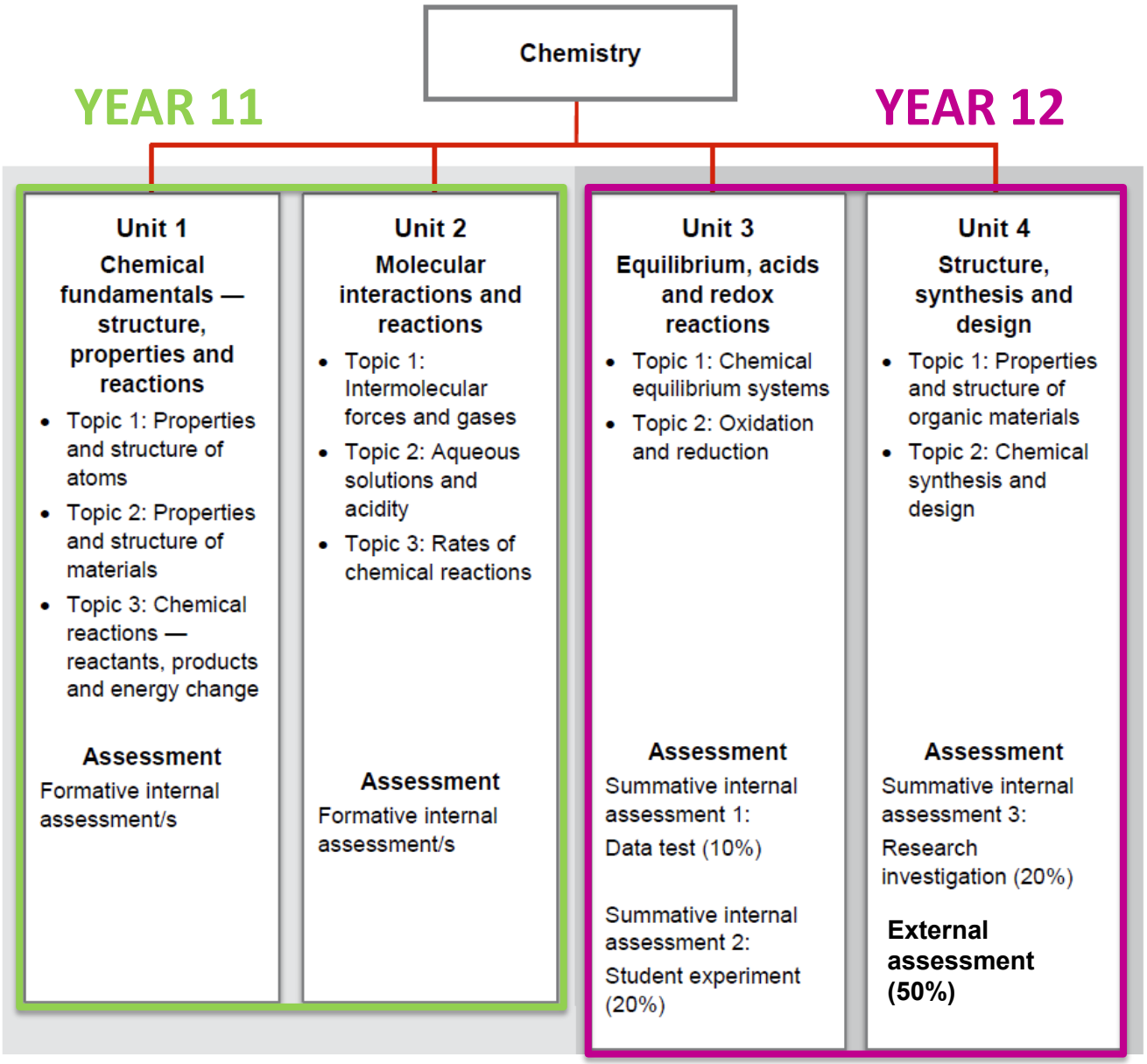
- Chemistry teacher and district panel chair for QCAA senior syllabus.

PART A

# Key dates for Chemistry for Queensland

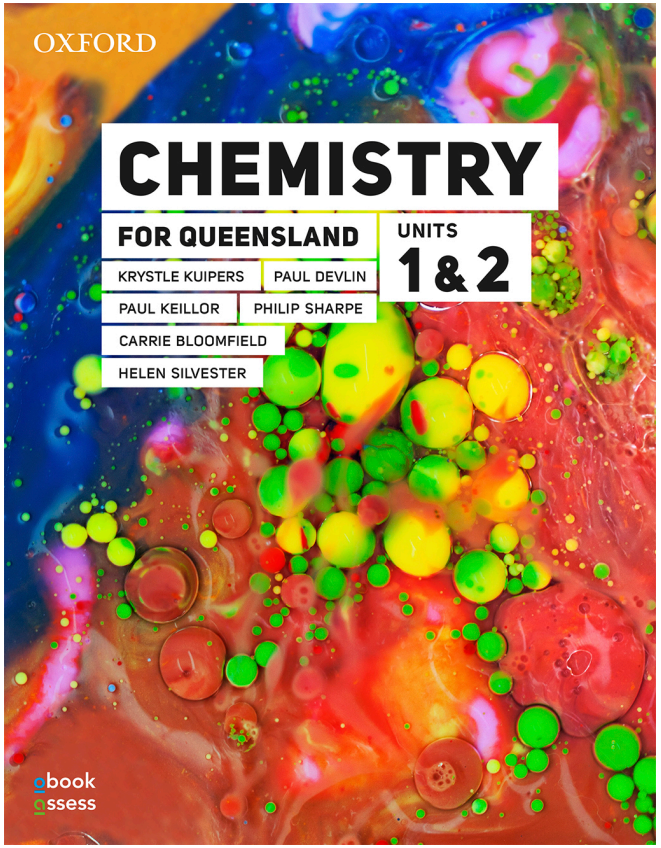
| Units 1 & 2 – 2019 | Units 3 & 4 – 2020 |
|---|---|
| **TERM 1** | T1 W2 Endorsement IA3 |
| Units 1 & 2 FIA1 Data test | Units 3 & 4 IA1 Data test |
| **TERM 2** | T2 W1 Confirmation IA1 |
| Units 1 & 2 SUBMIT FIA2 SE | Units 3 & 4 SUBMIT IA2 SE |
| **TERM 3** | |
| T3 W6 Endorsement FIA1, FIA2 | |
| Mock assessments available | SUBMIT IA3 RI<br>T3 W8 Confirmation IA2, IA3 |
| **TERM 4** | |
| Units 1 & 2 SUBMIT FIA3 RI | T4 W4-7 External assessment |
| | T4 W4-7 External assessment |
| | T4 W4-7 External assessment |
| Units 1 & 2 Exam | |

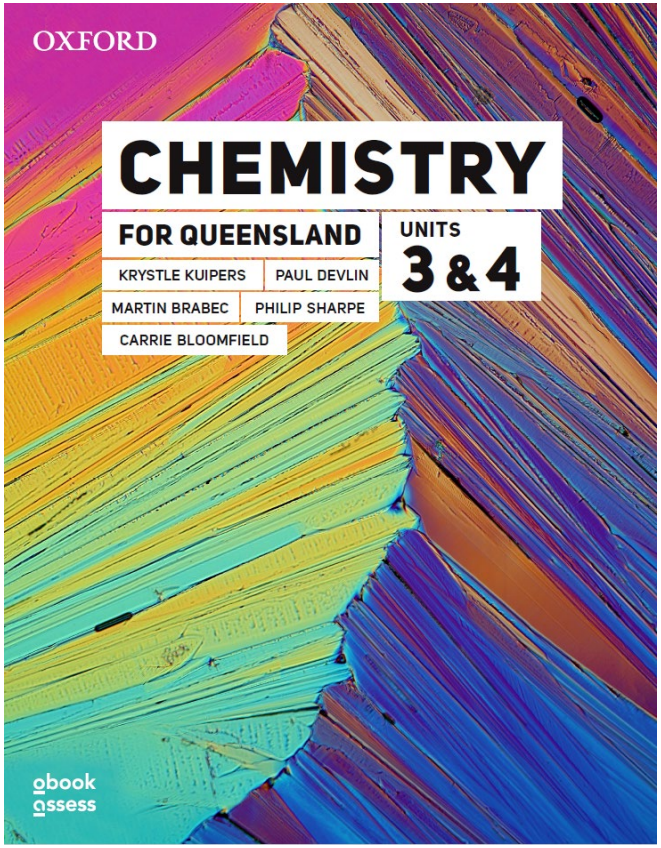
# Course structure



PART B

# An introduction to Oxford's new series *Chemistry for Queensland*



# Our goal for this series is to:

- **support** teachers and students through a massive period of change
- **provide** a set of resources that give students of all abilities the chance to experience real success in SCIENCE
- offer the **best content** and the most valuable and **practical support materials for assessment**.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# Pain points in the Chemistry syllabus

| Unit 3<br>Equilibrium, acids and redox reactions | Unit 4<br>Structure, synthesis and design |
|---|---|
| **Topic 1: Chemical equilibrium systems** | **Topic 1: Properties & structure of organic materials** |
| • Titrations are introduced to students here. To support teachers, we have provided two different Mandatory practicals on titrations. One with an easier end point and one with easier calculations. | • Chapter 14 has complex analytical techniques. Students learn the use of heuristics to simplify how they approach spectroscopy problems in mass spec. (e.g. Rule of 13) and IR (work flow process). |
| **Topic 2: Oxidation & reduction** | **Topic 2: Chemical synthesis & design** |
| • Electrolytic and galvanic cells can be confusing for students. These chapters have very detailed diagrams with a large number of examples. | • Molecular manufacturing. We have tried to draw a clear distinction here between science fiction and fact and to emphasise how basic chemical principles are relevant. |

# Top 5 things to know about Oxford's new *Chemistry for Queensland* series

**1**

We offer complete syllabus coverage

- All subject matter in the syllabus has been included and ordered **sequentially** to help scaffold learning.
- Every chapter opener clearly indicates which syllabus points are covered.
- If it's covered in the syllabus, it's covered in our book!

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# Top 5 things to know about Oxford's new *Chemistry for Queensland* series

**2**

We offer extensive support for the assessments

- Toolkits in both the Student book and Student workbook provide guidance for all assessments
- Complete syllabus coverage allows teachers and students to be prepared for the external exam
- **Student workbooks** provide students with engaging write-in activities that support the skills required for the internal and external assessments
- Practice Data tests, cumulative tests and exams are provided in your obook assess
- SHE spreads in the student book provide context for starting the Research investigation

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# Top 5 things to know about Oxford's new *Chemistry for Queensland* series

**3**

Our resources are easier to use and more accessible than ever before

To make our resources simple and easy to use, we have:

- a **section-based approach** to ensure our Student books are easier to navigate
- used clear, concise, instructional language throughout
- reduced the amount of text on each page and added more **graphic organisers** (i.e. tables, dot points, flowcharts) and **images** to convey meaning
- built in opportunities for teachers to support and challenge students of all abilities
- added a bright, attractive and functional design.

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# Top 5 things to know about Oxford's new *Chemistry for Queensland* series

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**4**

We offer full coverage of all syllabus practicals

- Videos for challenging practicals
- Editable worksheets for all practicals in the obook assess alongside mock data and answers
- Full risk assessment and lab tech notes for all practicals – authored by a fully-qualified lab technician
- Mandatory practicals in the Student book
- All practicals are included in the Student workbooks as worksheets

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# Top 5 things to know about Oxford's new *Chemistry for Queensland* series

**5**

We offer full support for teachers to encourage student success

- Teachers are provided with a range of **additional support materials** to help them successfully implement the new syllabus (i.e. **teaching notes**, **lesson plans**, **assessment tasks** and **answers** to all questions).
- Videos of key practicals and challenging concepts
- Spread-based learning
- obook content is assignable at the discretion of the teachers

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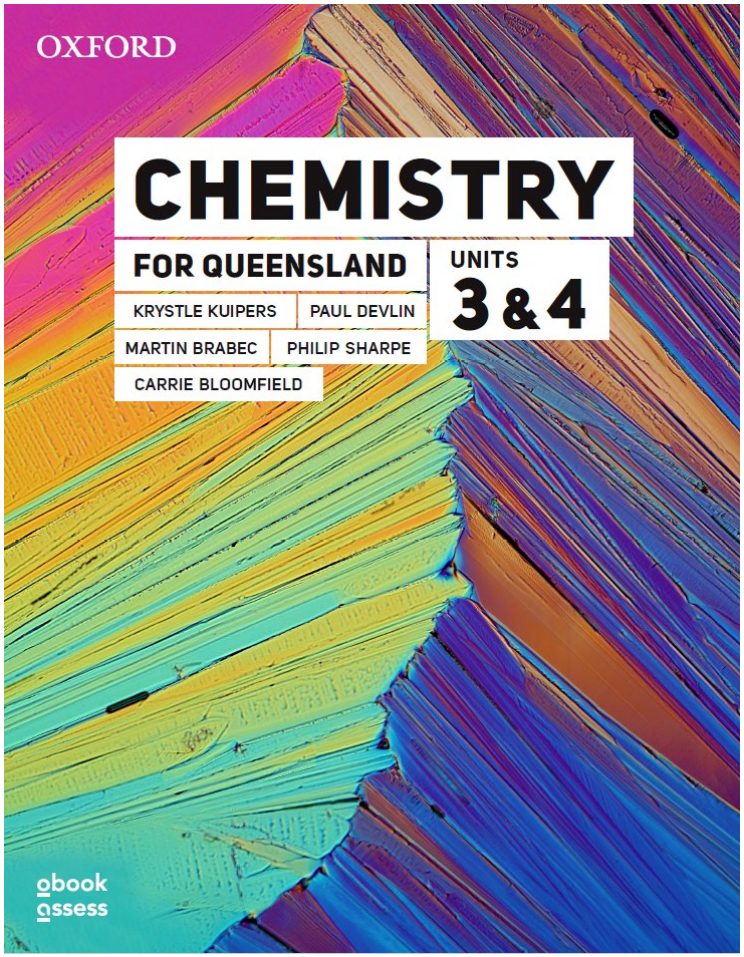
# Chemistry toolkit

The Chemistry toolkit is **stand-alone reference chapter** that appears at the front of each Student book. It includes:

- an overview of the course for students
- advice and step-by-step instructions on how to master relevant skills
- information about relevant assessment tasks
- study tips.

# A quick tour of our new Student books

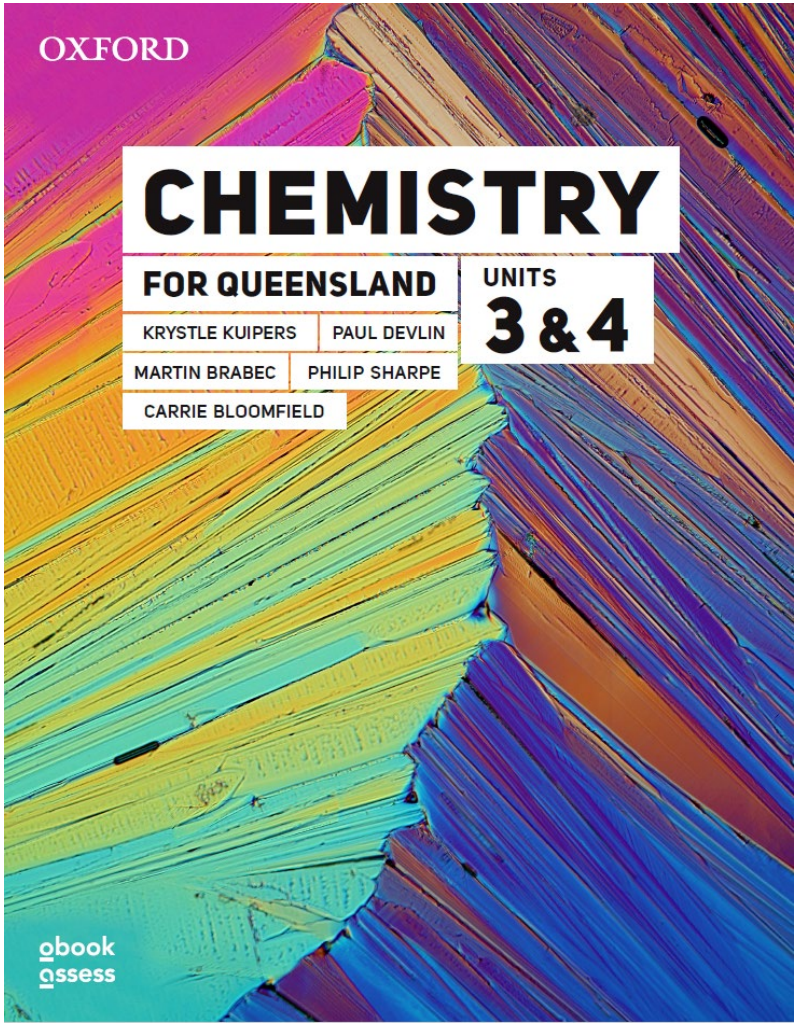



Join us on a quick walkthrough of *Chemistry for Queensland Units 3 & 4*

A sample/page proof is available!

# Key features

- Key ideas
- Case studies
- Worked examples
- Study tips
- Margin glossary
- Check your learning
- Science as a human endeavour
- Chapter review
- Revision questions
- Unit practice exam questions
- **Chemistry toolkit** (skills chapter)
- **Practical manual** (cover all mandatory and suggested practicals)



**Case studies**
Engaging applications of chemistry for students to consolidate difficult concepts.

## CASE STUDY 6.2

### What happened to the Statue of Liberty?

The Statue of Liberty was gifted to the American people by the French people and was erected in New York Harbour on 19 June 1885. The statue has an outer coating of copper, about the thickness of two Australian 20-cent coins placed together. The internal metals are cast iron and stainless steel. When it was first erected, the statue was brown due to the external copper coating.

Over time, the copper reacted with oxygen in the air, corroding to form copper oxide. Copper loses electrons to oxygen, forming $Cu^+$ and $O^{2-}$. Therefore, copper is oxidised and oxygen is reduced, forming $Cu_2O$ a red solid.

$$4Cu(s) + O_2(g) \rightarrow 2Cu_2O(s)$$

$Cu_2O$ is further oxidised, forming $Cu^{2+}$ in CuO – a black solid.

$$2Cu_2O(s) + O_2(g) \rightarrow 4CuO(s)$$

, the large amount of coal that was burnt released sulfur dioxide into the atmosphere. This caused further reactions such as the copper-based minerals malachite (green), azurite (blue) and

$$CuO(s) + CO_2(g) + H_2O(l) \rightarrow Cu_2CO_3(OH)_2(s)$$

malachite

$$uO(s) + CO_2(g) + H_2O(l) \rightarrow Cu_3(CO_3)_2(OH)_2(s)$$

azurite

$$4CuO(s) + SO_3(g) + 3H_2O(l) \rightarrow Cu_4SO_4(OH)_6(s)$$

brochantite

**FIGURE 1** Malachite is a green mineral with formula $Cu_2CO_3(OH)_2$.

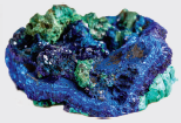


**FIGURE 2** Azurite is a blue mineral with formula $Cu_3(CO_3)_2(OH)_2$.

**FIGURE 3** Brochantite is a green mineral with formula $Cu_4SO_4(OH)_6$.






**FIGURE 4** The Statue of Liberty (a) as it was originally erected in 1886 and (b) as it is today.

## CHECK YOUR LEARNING 6.2

### Describe and explain

1 **Define** 'oxidation state'.

2 **Explain** what happens to oxidation numbers in reduction reactions.

### Apply, analyse and interpret

3 **Determine** the oxidation numbers of the atoms in the following chemical substances.

| | |
|---|---|
| **a** $O_2$ | **e** NaOH |
| **b** $NO_2$ | **f** $H_2O_2$ |
| **c** $SO_4^{2-}$ | **g** NaH |
| **d** $CH_3COO^-$ | **h** $PO_4^{3-}$ |

4 **Determine** the oxidised and reduced atoms in the following equations. Use their oxidation numbers to **justify** your answers.

**a** $2Fe(OH)_2(aq) + 3OCl^-(aq) \rightarrow 2FeO_4^{2-}(aq) + 3Cl^-(aq) + H_2O(l) + 4H^+(aq)$

**b** $Fe^{2+}(aq) + 6H^+(aq) + VO_4^{3-} \rightarrow Fe^{3+}(aq) + VO^{2+}(aq) + 3H_2O(l)$

**c** $2Cr_2O_7^{2-}(aq) + 16H^+(aq) + C_2H_5OH(l) \rightarrow 4Cr^{3+}(aq) + 2CO_2(g) + 11H_2O(l)$

### Investigate, evaluate and communicate

5 **Investigate** steel and stainless steel.

**a** What are both materials made of?

**b** What are they used for?

**c** Do they corrode? **Justify** your answer with a chemical equation or an explanation.

**d** What are the advantages and disadvantages of using both materials?

6 In an experiment, copper metal was placed in a

You can find the following resources for this sectio

» Student book questions
Check your learning 6.2

» Challenge
6.2 Oxidation of alcohol



**Check your learning questions**
Scaffolded questions for retrieval and comprehension, analytical processes and knowledge utilisation.

# 6.3 Half-equations and overall redox equations

**KEY IDEAS**

In this section, you will learn about:

- oxidation and reduction half-equations
- combining oxidation and reduction half-equations to develop an overall redox equation.

**half-equation** an equation that represents either an oxidation or a reduction half of a chemical equation; it includes electrons to demonstrate electron transfer

Redox chemical equations can become quite complicated because of the number of chemical species involved. For this reason, redox equations are balanced in two **half-equations** – the oxidation half-equation and the reduction half-equation. These equations are then combined to form an overall chemical redox equation.

## Identifying and writing half-equations

The oxidation half-equation demonstrates an atom losing electrons, while the reduction half-equation demonstrates an atom gaining electrons.

The following reaction between copper(II) sulfate and zinc metal shows you how to identify the chemical species being oxidised and reduced and how to write the oxidation and reduction half-equations from an overall equation.

$$CuSO_4(aq) + Zn(s) \rightarrow Cu(s) + ZnSO_4(aq)$$

Assign oxidation states to identify chemicals being oxidised and reduced. In this case, it is easier to deal with sulfate because its oxidation state is equal to its charge of –2.

+2 –2 0 0 +2 –2

**spectator ion** an ion that has no change in oxidation state from the left to the right side of a redox reaction

Both copper and zinc a… oxidation states. Sulfate is a…

The oxidation state of … reduction. To represent its…

Although copper is bala… electrons to one side of the… whichever side they are ad… of +2 and the product has … balance the equation.

The oxidation state of …

$Zn(s) \rightarrow Zn^{2+}(aq)$

Balance the +2 charge …





## Overall redox equations

When you have identified the oxidation and reduction half-equations, c… an overall redox equation. To do this, both half-equations must have th… electrons so that they can cancel out in the final equation.

The zinc and copper half-equations combine easily because they bot… When you combine the half-equations, the electrons can be cancelled o… following balanced equation:

$$Cu^{2+}(aq) + 2e^- + Zn(s) \rightarrow Cu(s) + Zn^{2+}(aq) + 2e^-$$

$$Cu^{2+}(aq) + Zn(s) \rightarrow Cu(s) + Zn^{2+}(aq)$$

An additional example using aluminium ions and magnesium metals ca… obook assess.

**WORKED EXAMPLE 6.3**

Identify the oxidation and reduction half-equations and the overall redox equation in the following reaction:

$$Fe(s) + 2HCl(aq) \rightarrow FeCl_2(aq) + H_2(g)$$

**SOLUTION**

1 Assign oxidation states to identify the atoms that have been oxidised and reduced.

0 +1 –1 +2 –1 0

$Fe(s) + 2HCl(aq) \rightarrow FeCl_2(aq) + H_2(g)$

Chlorine has no change in oxidation state so it is a spectator in the reaction.

2 The oxidation state of iron increases from 0 to +2, so iron is oxidised. The oxidation half-equation is:

$$Fe(s) \rightarrow Fe^{2+}(aq) + 2e^-$$

3 The oxidation state of hydrogen decreases from +1 to 0, so hydrogen is reduced. $H_2$ is formed, so balance the hydrogens before adding electrons. The reduction half-equation is:

$$2H^+(aq) + 2e^- \rightarrow H_2(g)$$

4 Combine the reduction and oxidation half-equations to get the overall equation (you do not need to multiply these equations because they have the same number of electrons):

Overall: $Fe(s) + 2H^+(aq) \rightarrow Fe^{2+}(aq) + H_2(g)$

**Study tip**

When combining half-equations, they must have the same number of electrons. Multiply the coefficients of the electrons in both equations if the charges are not balanced.

**CHALLENGE 6.3A**

**Oxidation of butanol**

Butanol is oxidised to butanoic acid by a solution of acidified sodium dichromate according to the following half-equations:

$$Cr_2O_7^{2-}(aq) + 14H^+(aq) + 6e^- \rightarrow 2Cr^{3+}(aq) + 7H_2O(l)$$

$$CH_3CH_2CH_2CH_2OH(aq) + H_2O(l) \rightarrow CH_3CH_2CH_2COOH(aq) + 4H^+(aq) + 4e^-$$

Combine the half-equations and write the balanced overall equation for the reaction.





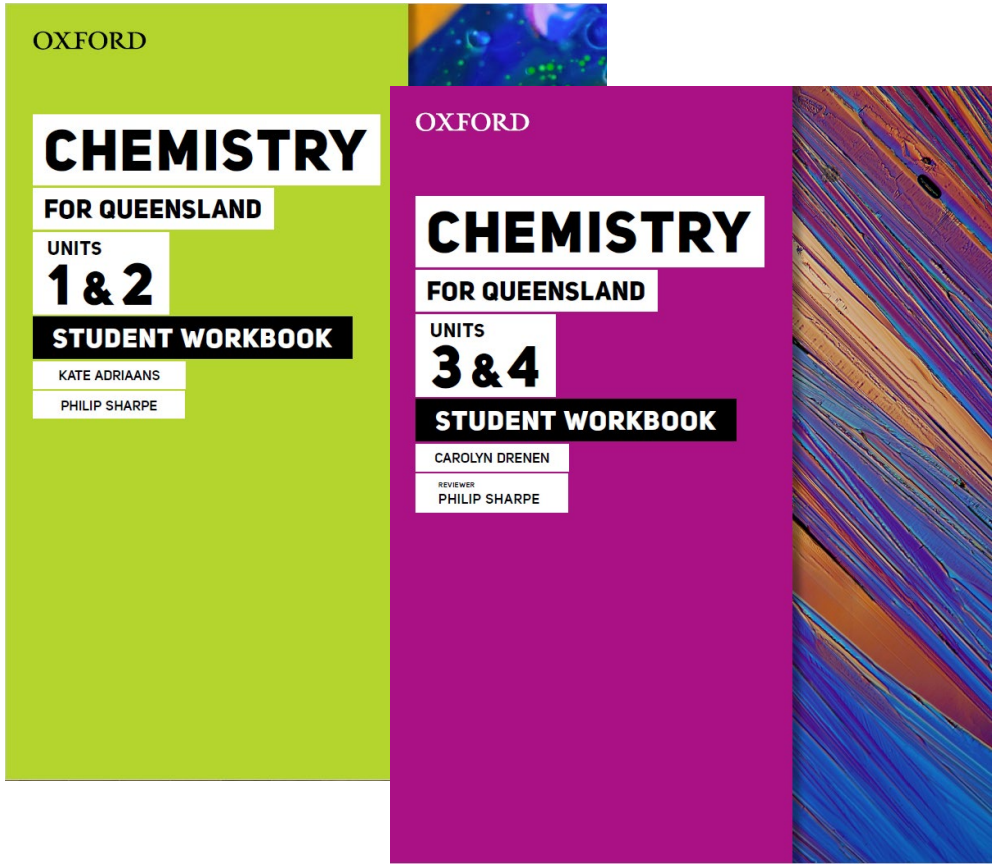
**Study tips** – hints/tips and reminders of key concepts to support students for with external assessments.

**Worked examples** – Step by step working for students to follow and understand key formulas, calculations, and application of ideas.

**Challenges** – Extension questions on difficult and applied chemistry.

PART C

# A quick tour of our new Student Workbooks

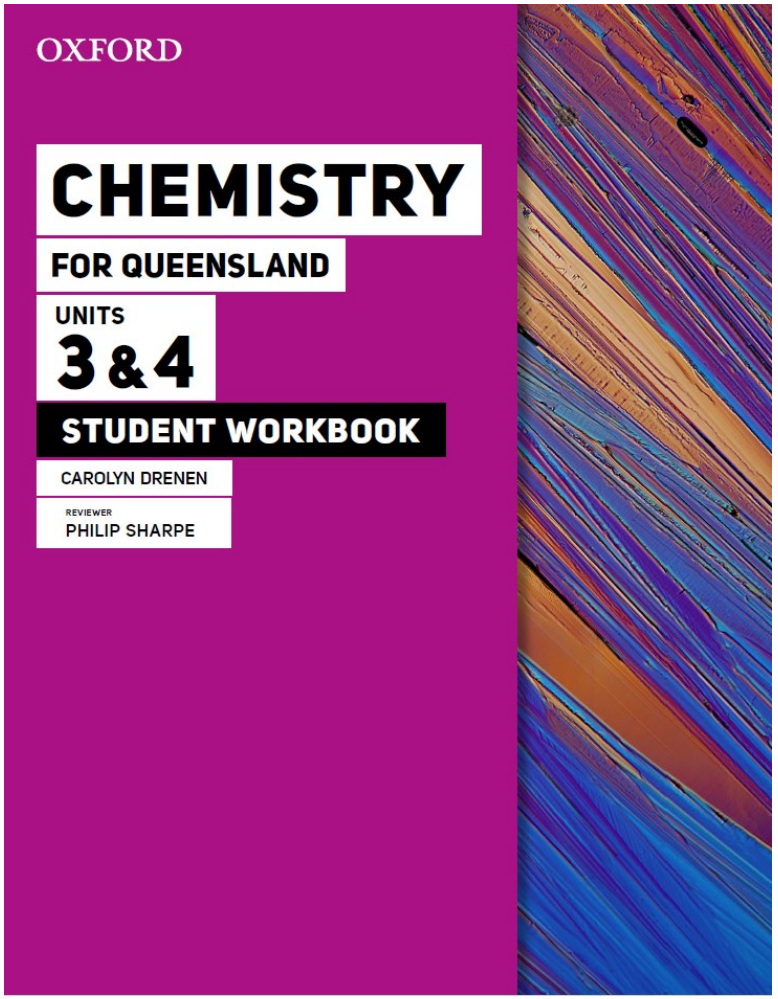



Join us on a quick walkthrough of the Student Workbooks

A sample chapter is available in your workshop pack!

# Key features

- Chemistry toolkit – overview of internal assessments
- Chapter checklists – individual self determination of key subject matter
- Data drill – interpretation and analysis skills for the Data test
- Experiment explorer – skills in modifying a practical
- Research review – evaluating a claim and conducting credible research
- Exam excellence – practice exam style questions
- Practice internal assessments
- Practical manual – all mandatory and suggested practicals
- Answers – to all questions and practice assessment s



CHAPTER 6

# Redox reactions

Redox is an abbreviation for reduction and oxidation reactions, which occur together. This means that when an o… occurs at the same time.

Oxidation is the loss of electrons … (an electron donor). Reduction is th… shell of the oxidant (an electron acce…

Assigning oxidation numbers to … oxidation or reduction reaction has … metal elements are written in roman … name, such as copper(II), or are wri…

A decrease in oxidation number …

An increase in oxidation number …

Half-equations represent either t… redox reaction; they must show elec… spectator ions, and they are combined to form overall redox reactions, as shown in the following example:

Oxidation half-equation: $Zn(s) \rightarrow Zn^{2+}(aq) + 2e^-$

Reduction half-equation: $Ag^+(aq) + e^- \rightarrow Ag(s)$

Overall redox reaction: $Zn(s) + 2Ag^+(aq) \rightarrow Zn^{2+}(aq) + 2Ag(s)$

## CHAPTER CHECKLIST

Read this checklist before you complete this chapter's activities and then return to it to check your understanding before your assessments.

Once you have completed this chapter, you can use the 'I can…' statements to assess your understanding and rate yourself by ticking the appropriate box in the 'rating' column.

| I can… | Confidently | Partially | Not really |
|---|---|---|---|
| … understand the transfer of electrons during oxidation and reduction. | | | |
| … understand redox reactions. | | | |
| … determine oxidation numbers. | | | |
| … construct and combine half-equations into overall redox equations. | | | |

FIGURE 1 The rust on the wreck of the SS *Maheno* at Fraser Island is caused by oxidation of metal exposed to the …



**Data drills**
Interpretation and analysis of data to practice skills required in the Data test (IA1)

**Chapter checklists**
Individual self-determination of key subject matter for each chapter

## DATA DRILL 6

### Blood alcohol concentration

A graph showing the blood alcohol concentration (BAC) per number of drinks for an Australian male with an average mass of 86 kg (in 2011–2012) is given in Figure 2 below.

1 **a** **Define** and **calculate** the relationship between the blood alcohol concentration and the number of drinks for an Australian male with an average mass of 86 kg (in 2011–2012). **Use** evidence from the graph to support your answer.

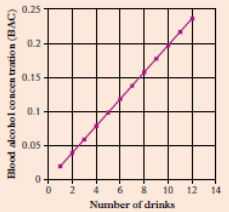


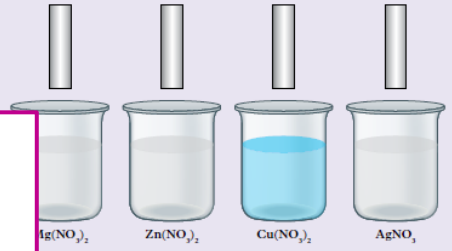

FIGURE 2 Blood alcohol concentration per number of drinks for an Australian male with an average mass of 86 kg (in 2011–2012).

**b** Using the graph and your answer from 1a above, **extrapolate** the data to **predict** the blood alcohol concentration for an Australian male after 20 drinks.

## EXPERIMENT EXPLORER 6

### Magnesium metal in salt solutions

1 Four strips of magnesium metal are added to four separate beakers containing solutions of these metal salts: magnesium nitrate, zinc nitrate, copper(II) nitrate and silver(I) nitrate (see Figure 3).




…n metal is added to beakers containing solutions of different metal salts.

CHAPTER 17

# Practical manual

The QCAA Chemistry General Senior Syllabus outlines a number of mandatory and suggested practicals for completion in Units 3 & 4. All practicals are included in this chapter.

Suggestions for methodology and materials have been supplied in this chapter and the practicals are listed in the tables here. However, the following is not prescriptive; schools may complete the mandatory or suggested practicals in any other form suited to their resources.

The experiments in this chapter have been trialled and cautions of obvious hazards given; however, it is the legal obligation of the individual teacher to carry out their own risk assessment prior to undertaking any practical activity.

If you are unsure of any procedures in the lab or need any clarification for a practical, consult your teacher and/or lab technician.

## SAFETY IN THE LABORATORY

This chapter will highlight key safety concerns within each practical; however, there are some general safety concerns to be considered in all practicals.

- Hair should be tied back.
- Do not eat or drink in the lab.
- Always be aware of your peers and act sensibly.
- Wear a lab coat, safety glasses and closed-toed shoes.
- Review the school's safety procedures and location of eye wash, shower, spill kits and first aid kits.
- Handle all chemicals with care and consult your teacher and risk assessments for the hazards involved with each chemical.
- Keep open flames away from flammable materials.
- Handle hot materials with the appropriate equipment (i.e. heat-resistant gloves or tongs).
- Always check that electrical equipment have no damaged or exposed wires before use.



## 6.1 MANDATORY PRACTICAL 6.1 Performing single displacement reactions

**CAUTION:** $CuSO_4$ is toxic and harmful to the environment. Wear personal protective equipment at all times. If the chemical comes in contact with skin, flush the affected area for 15 minutes and consult a healthcare professional. If swallowed, contact the poison centre. Consult your lab technician when disposing of the chemical.

Hydrogen gas, which is highly flammable, is produced during this experiment. Keep away from open flames until ready to combust.

Perform single displacement reactions in aqueous solution

### Context

Single displacement reactions occur when a stronger redu

### Aim

To perform single displacement reactions and observe any

### Materials

- 1 M $CuSO_4$
- Zinc metal strip
- 1 M HCl
- Magnesium metal strip cut into 0.5 cm lengths
- 10
- 2
- T
- M

### Method

**Part A**

1 Pour 50 mL of 1 M $CuSO_4$ into the 100 mL beaker. Add the zinc metal strip.
2 Observe the changes every 2 minutes for 10 minutes. Record your observations about colour changes, bubbles, appearance of the metal and temperature.

**Part B**

1 Place five 0.5 cm lengths of magnesium metal strip into a test tube.
2 Add approximately 2–3 cm of 1 M HCl to the test tube and quickly place the second test tube on top (upside down or inverted) to trap any gases produced.
Note: Do not hold the test tube at the bottom; hold it at the top above the solution line.
3 Record your observations about colour changes, bubbles, appearance of the metal and temperature.
4 When the reaction stops producing bubbles, remove the top test tube and keep it inverted (upside down). Light a match and, when ready, hold it at the opening of the test tube.
5 Record any observations of the effects of holding the match under the test tube.



**All practicals** – Offers students write-in worksheets for all mandatory and suggested practicals from the syllabus.

## Unit 3 Research investigation

Note: The research investigation internal assessment (IA3) is completed in Unit 4 and covers content from Unit 4. There is no assessable research investigation during Unit 3. This research investigation has been included for you to practise the skills required for the Unit 4 assessment.

### OCEAN ACIDIFICATION: WHAT ARE THE IMPACTS?

Carbon dioxide makes up 0.035% of our atmosphere, which directly or indirectly provides food for all living species through the process of photosynthesis. Carbon dioxide is consumed through photosynthesis and then re-released to the atmosphere through respiration in plants and animals. However, other ways that carbon dioxide can return to the atmosphere include waste or dead animal decomposition, volcanic activity and combustion of fossil fuels. Currently the atmospheric levels of carbon dioxide are increasing due to our dependence on and the rapid rate of burning fossil fuels.

Because carbon dioxide is soluble in water, it is rapidly dissolved by the oceans, generating carbonic acid. As the amount of carbon dioxide in the atmosphere increases, more dissolves into the ocean, increasing the ocean's acidity. This increasing acidity is gradually affecting the marine environment and the species that inhabit the oceans (see Figure 3) and may eventually lead to further social and economic impacts on coastal communities.

**FIGURE 3** An example of the before- (left) and after-effects (right) of ocean acidification on the Great Barrier Reef.

Your task is to conduct a research investigation about the following claim, which is related to the case study above:

'Oceans acting as a carbon dioxide sink are increasing in acidification, which can impact the environment, marine species and coastal society.'

### Student's research question



### Conduct research

#### Resource 1

Title:

Authors:

Source and credibility:

Publication date:

Aim:

Resource's research question:

#### Methodology

What data was collected?

How was the data collected?

#### Results

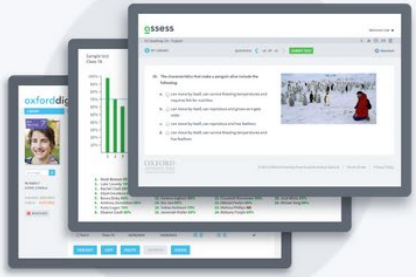
Did the resource support your research question?

**Practice internal assessments**
Support the skills required in the internal assessments
**Note: these are not QCAA draft assessments and should only be used as practice for the internal assessments.*

# Digital resources and purchasing options


## obook

obook is a fully interactive digital version of every student book with note-taking, highlighting and dictionary support included. Every obook contains links to additional resources, such as videos, interactive modules and worksheets.



## assess

assess is an online assessment platform that provides access to tens of thousands of additional auto-correcting questions designed to support student understanding and progression across all subjects.

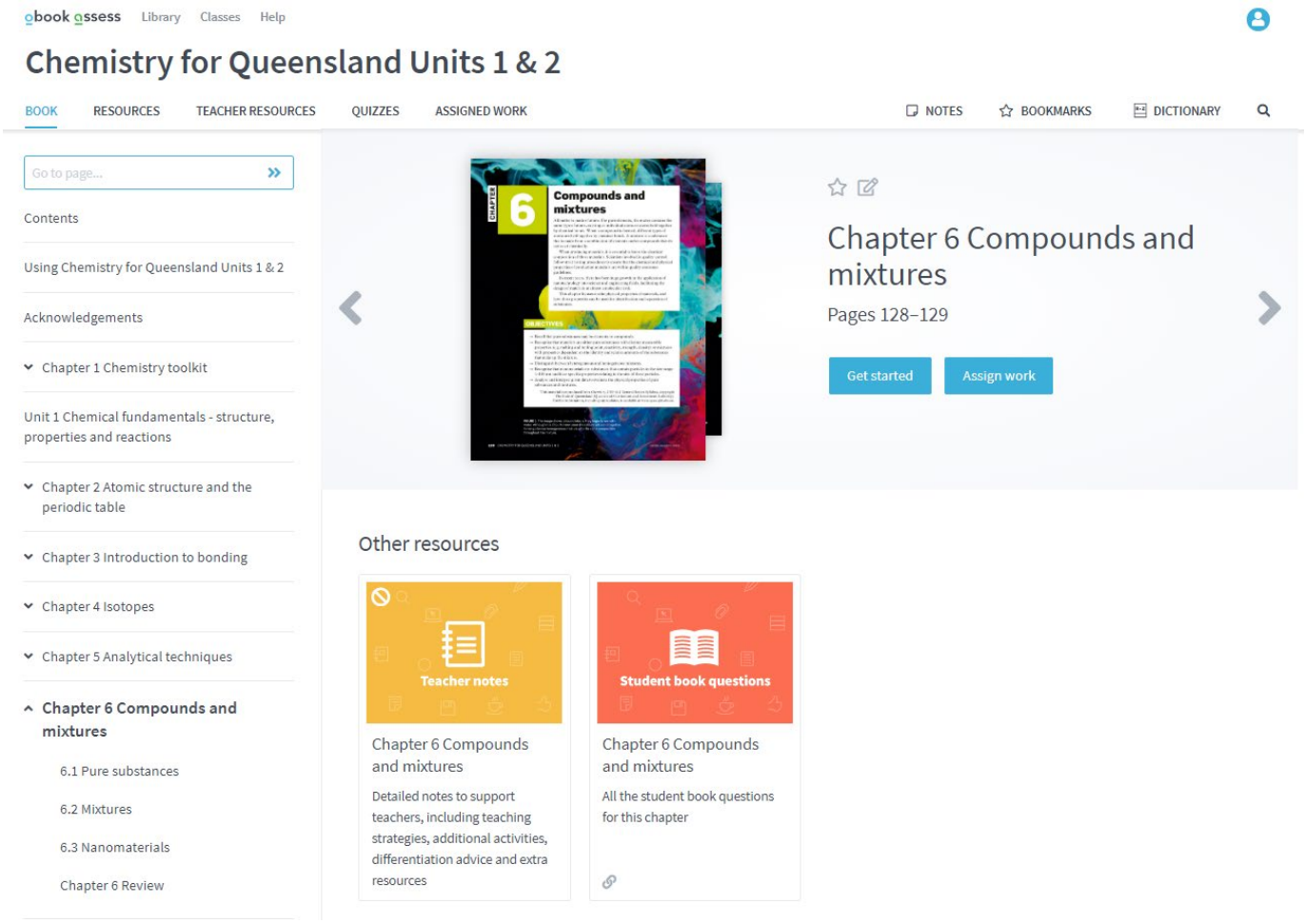

## Teacher support

Additional teacher notes, answers, tests, and assessments and differentiated learning advice is all included for teachers. Teacher obook assess also allows teachers to assign work electronically, track progress, and manage results and assessment.

*Chemistry for Queensland* is supported by a range of additional digital resources, including:

- **obook**
- **assess**
- **Teacher support**.

obook




**obook**:

- is visually integrated with the printed Student book, enabling students to move seamlessly between print and digital products
- provides a range of additional teacher and student resources.

obook

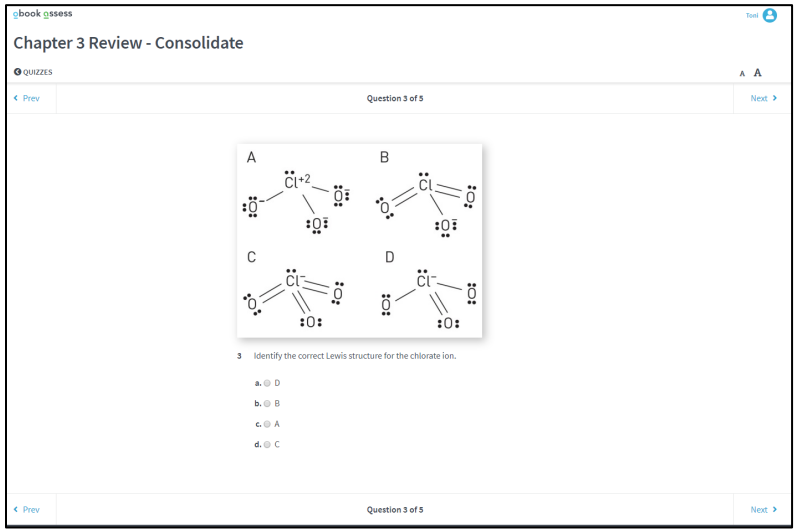
## Additional student resources

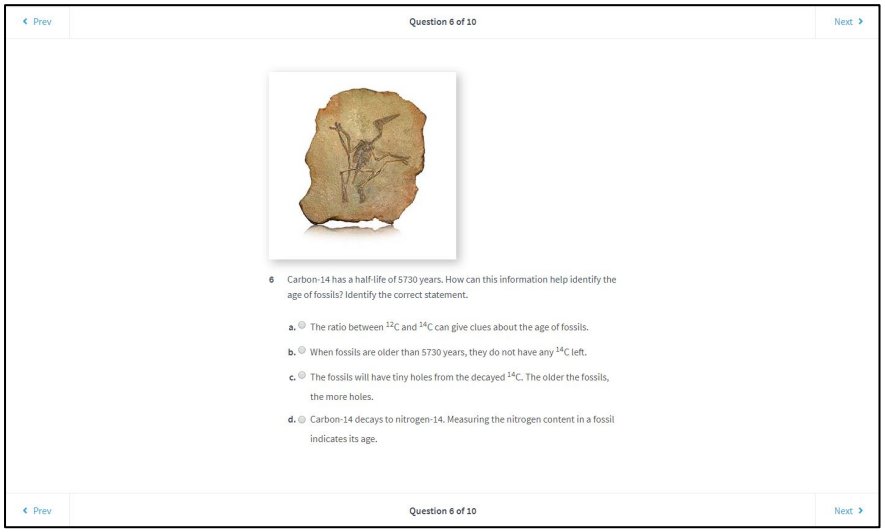
There is additional support available online, including:

- Teacher notes
- Answers
- Practice exams and cumulative tests
- Data tests
- Practical worksheets (for all mandatory and suggested practicals)
- Lab tech notes and risk assessments
- Video tutorials
- Revision notes for students
- Increase your knowledge (extra resources that consolidate and expand student understanding.

These are all designed to help you feel confident that your students will be prepared for their internal and external assessments.

assess




**assess**:

- provides hundreds of differentiated, auto-marked quiz questions, ideal for homework or in-class use
- questions are aligned to the syllabus and graded for different ability levels.

# Teacher support

**Teacher support** includes:

- detailed **teaching notes** and **course planners**
- answers to **EVERY** question and activity in the Student Book
- a range of **additional worksheets** (with answers)
- **editable data tests** (with suggested answers)
- **editable practice examinations** (with answers).

Students receive **digital access for 2 years** when purchasing print Student books – **ideal for revising Year 11 content in Year 12**.

Schools that purchase Oxford resources receive **FREE print Student Books for all teachers** and **ongoing access to all digital resources and teacher support**.

| *Chemistry for Queensland Units 3 & 4* | Format | Price |
|---|---|---|
| Student book + obook assess<br>Print book with 2-years' digital access included | PRINT + DIGITAL | $69.95 |
| Student obook assess<br>Digital book with 2-years' digital access included | DIGITAL | $49.95 |
| Student obook assess MULTI<br>Digital book that includes 3 x 2-years' digital access | DIGITAL | $59.95 |
| Teacher obook assess*<br>Digital book that includes access to additional teacher only resources – ongoing access. | DIGITAL | $299.95 |
| Student Workbook<br>4 colour write in print book that provides assessment support | PRINT ONLY | $24.95 |

* FREE ongoing access to Teacher obook assess with booklist or class set purchase

| Digital renewal fees | |
|---|---|
| Institution | $5 per student for an additional 15 months' access<br>A service fee to support annual rollover of subscriptions |

**If your school has a different purchasing model, ask our team about options.**

| ***Chemistry for Queensland Units 3 & 4*** | **Samples** | **Final product** |
|---|---|---|
| Student book + obook assess (print + digital) | Full page proofs (print)<br><br>**June 2019** | **October 19** |
| Student obook assess (digital only) | Full page proofs (digital)<br><br>**June 2019** | **July 2019** |
| Teacher obook assess (digital only) | Unit 3 – Topic 1<br>Chapters 1-4<br>• Teacher notes<br>• Student book answers<br><br>**Term 4 start 2019** | **January 2020** |
| Student workbooks (print only) | Units 3 & 4 **22-05-2019**<br><br>Units 1 & 2 ***NA*** | Units 3 & 4 **October 2019**<br><br>Units 1 & 2 **January 2019** |