IGCSE Chemistry

Introduction

Welcome to your IGCSE Chemistry course. This introduction will serve as a guide to what you can expect from the course, and it will show you how to plan your study of this course effectively. Take your time to read this Introduction thoroughly before you start the lessons.

The course is designed to prepare students for examination in the **Edexcel IGCSE Chemistry specification** (**4CH1**), which is examined for the first time in May/June 2019.

The Course

The course is designed to develop (1) a broad understanding of chemical facts, concepts and principles, (2) skills in chemical investigation and (3) an ability to evaluate the benefits and drawbacks of modern scientific developments.

In combination with other suitable IGCSE entry subjects, the course is an ideal preparation for those who wish to go on to study Chemistry at AS and A level.

The course is designed to be accessible to students who may have only a limited previous background in science. If you have some background in Chemistry then you should find that some of the lessons build upon things that you have met before in your earlier studies.

Practical Work

The practical work described at various places in this course is to help to develop your skills for the practical-based components of the theory exams. Both exams will include questions related to this. Three of the lessons are devoted to the development of practical skills, and there is a very useful Appendix at the back of the textbook (pages 322 – 327) to help you further.

Carrying out practical work obviously presents a problem for home-based students. Sometimes experiments are described which can be carried out safely at home using household materials, and you should make every effort to do these for yourself. In addition, if you have the opportunity to perform supervised laboratory work in the course of your studies, this will be a great help.

When carrying out any practical work in Chemistry, safety is paramount.

- Never **taste** any materials unless you are sure that it is safe to do so.
- Always wear **eye protection** if heating any substance or using any corrosive liquid.
- Never handle **flammable** materials in the presence of a naked flame.

If in the slightest doubt about the safety of a procedure, do not carry it out without seeking professional advice. Your tutor will be able to help in this matter.

Textbook

The textbook that is referred to throughout this course is:

Jim Clark, Steve Owen & Rachel Yu, *Edexcel International GCSE (9-1) Chemistry: Student Book* (2017, Pearson Education; ISBN: 978 0 435 18516 9)

You will need a copy of this textbook throughout the course; you can buy a copy through the Oxford Open Learning website. The textbook is referred to in every lesson and provides excellent coverage of the material. By using the textbook and the course together you will be fully prepared for the examinations at the end.

You should not need other books during the course, but you may like to look in other science books from time to time. If you feel that you would like to use a revision guide before the examination, you should ask your tutor which one they recommend.

Tiering and IGCSE Examination Entry

Science IGCSE examinations are not divided into different entry tiers. So candidates of all abilities sit the same exam papers.

Arrangement of Lessons

The lessons are planned so that all the material and preparation required for both examination papers, Chemistry Paper 1 and Chemistry Paper 2, are covered by the six modules of the course. Topics that will be examined only in Paper 2 (from June 2019 onwards) are given in **bold type** in the lesson aims at the beginning of each lesson.

The six course modules are:

Module 1: Introducing Chemistry
Module 2: Chemistry Investigations
Module 3: Chemical Patterns
Module 4: Chemistry in Practice
Module 5: Organic Chemistry
Module 6: Chemistry Calculations

You are advised to do the modules in order, as the content has been written to enable you to develop your knowledge and skills as you progress through the lessons.

Arrangement of Lessons and Textbook References

Chemistry IGCSE **Module 1: Introducing Chemistry**		
Lesson	*Title*	*Textbook pages*
Intro	Using Numbers in Chemistry	
1	Substances, Particles and Solutions	3-12, 14-15
2	Atomic Structure	24-28, 30-33
3	Chemical Bonds **TMA A**	75-80, 85-91
4	Structures and Properties	81-83, 92-96, 98-100
5	Formulae and Equations	38-41
6	Rates of Reaction **TMA B**	207-210, 227-238

Module 2: Chemistry Investigations		
Lesson	*Title*	*Textbook pages*
7	Investigative Skills A: Design	322-324
8	Investigative Skills B: Carrying out	322-323
9	Investigative Skills C: Interpreting **TMA C**	324-327

Module 3: Chemical Patterns		
Lesson	*Title*	*Textbook pages*
10	Oxygen and Oxides	137-143, 191, 270-273, 279
11	The Reactivity Series	145-157
12	Acids, Bases and Salts	167-187
13	The Periodic Table **TMA D**	30-36, 123-128, 130-135

Module 4: Chemistry in Practice		
Lesson	*Title*	*Textbook pages*
14	Separating and Analysing	15-21, 190-196
15	Electrolysis	101-110
16	Energy Changes during Reactions	207-210, 219-220
17	Reversible Reactions **TMA E**	240-246
18	Extracting and Using Metals	160-165

Module 5: Organic Chemistry		
Lesson	*Title*	*Textbook pages*
19	Organic Molecules	255-263
20	Alkanes and Alkenes **TMA F**	264-265, 277-280, 282-285
21	Crude Oil and Addition Polymers	268-275, 302-308
22	More Organic Molecules	287-291, 293-295, 297-300, 308-310

Module 6: Chemistry Calculations		
Lesson	*Title*	*Textbook pages*
23	Moles	25-27, 39-53
24	Equations and Calculations **TMA G**	53-59, 64-67
25	Energy Calculations	207-223
26	Titration	170-172, 67-72

	Mock Exam Paper 1 (TMA H)	
	Mock Exam Paper 2 (TMA I)	
	Appendix A: The Periodic Table	
	Appendix B: The Reactivity Series and Formulae of Ions	

Twig Resources

We hope that students of this course will also take the opportunity to learn from the wealth of Twig resources to which this course is linked. Twig have produced more than a thousand educational films, particularly for science, maths and geography, and these complement the lesson materials here to enhance the learning experience.

To view the films, you will need an e-mail account, internet access and a password, supplied to you on enrolment. As you work through the lessons, you will come across Twig-links quite regularly, looking like this:

Log on to Twig and look at the film titled: **Nylon**

www.ool.co.uk/1377mz

Nylon is one of the strongest polymers created by man. What makes it so durable?

To reach the film, you would either type the URL into your web-browser (here www.ool.co.uk/1377mz) or search the Twig site (www.twig-world.co.uk) for 'Nylon'. Having watched it, you return to the lesson.

Access to these resources is offered on the following terms:

1. OOL is not responsible for the content of the Twig films or for the technology which transmits them.

2. The films may not be accessible at certain times.

3. OOL cannot be responsible for any technical difficulties students may have in viewing the films and cannot advise on any software or hardware issues.

4. Access is limited in any case to the period until the student's expected exam date.

5. Students are responsible for remembering their own usernames and passwords. Please note: once assigned, a username *cannot* be changed. Passwords can be.

6. Passwords are supplied for the use of the named student only and should not be passed on to any third parties under any circumstances – because each password is unique it will be apparent if it is used on numerous machines.

7. The films are of greater or lesser relevance and it is probable that some parts of many of the films will be too "advanced" for your needs, include ideas you have not yet covered, or introduce information that is not required for the Edexcel specification.

8. If you find that a film is not helpful or interesting, stop watching it! It is possible to study the course successfully without watching *any* of the films. Remember that this is bonus material only, adding depth and context to the course, and this pack forms the spine of the learning material. But each film we have selected should make studying that little bit easier and more enjoyable.

9. Alongside each film, the Twig site offers various additional resources. You can download a transcript of the film, take a quiz or even an advanced quiz. These are optional extras if you have time and inclination.

Other Internet Resources

In most lessons of the course, other internet sites are also given which have been carefully selected to provide additional activities. Some of these have been designated as "Extension" activities. These links are an important tool in your understanding of your Chemistry course and you should make every effort to view them and use the activities that they contain. If you do not have an internet connection at home, consider building in regular trips to a library or internet café as part of your study schedule.

There are two ways of finding the correct webpage:

- type in the full webpage address given in the text
- search using the search phrase given in the text.

When you type in either the address or the search phrase it is important that you do not make typing errors, or miss out words. The search phrases have been carefully tested to bring the required website to the top of the list of sites returned by the search engine. If you cannot see the site you need on the first page of websites listed, you should try retyping the phrase and searching again. If you still have a problem, ask your tutor for help.

The Structure within each Lesson: How to Study

Front Page

The front page of each lesson shows:

- The **Title**.

- **Aims** for the lesson. These set out the position that you should reach after working through the lesson; keep these in mind while reading the lesson material. Paper 2 examines all of these aims, but Paper 1 does *not* examine the aims picked out in **bold** print.

- **Context**. This shows how the lesson relates to the Specification and the overall study plan.

- **Reading**. This section gives the textbook references for the lesson. This is additional reading to accompany the course.

Lesson Notes

There then follow the notes; these work systematically through the subject material to be studied in the lesson. Read the notes carefully several times and carry out the activities until you feel that you have understood the broad outline of the theory involved.

Then tackle the reading from the textbook. This will deal with some of the topics in greater detail than the notes. As with the notes, you will probably need to read some of the passages in the textbook several times.

The Textbook

Using the textbook

Instructions on how to use the textbook most effectively are found on pages vi-vii of the book itself. You should read these instructions carefully before carrying out the first set of textbook reading in Lesson 1.

Online textbook

Provided that you buy a new copy of the textbook, you will be able to access on online version of the book for three years. Instructions on how to do this are found on the inside front cover of the textbook.

The online version has answers to the questions found at the end of each chapter and section of the textbook. These answers are not in the print version.

Textbook questions

After each chapter and section in the textbook there are questions. You are recommended to try these as part of your study of the chapter. So that you have some questions to practise when you revise, you might like to work on alternate questions when you first study the chapter, e.g. try odd-numbered questions, leaving even-numbered questions for revision. You will get a spread of topics if you tackle odd and even questions, rather than only those at the start of the set of questions. Organise your answers so they are easy to refer back to; for example, use a separate notebook and write

down the textbook page number as well as the question number next to your answer.

Answers to these questions are found at the back of the online version of the textbook.

Activities

Activities are placed in the notes at relevant points. They are indicated as follows:

Activity 1	Look at Appendix A. How many of the elements did you know already?
	

The pencil symbol indicates that you should make your own notes in the space provided.

Self-Assessment Tests

Each lesson concludes with either a Self-Assessment Test (SAT) or a Tutor-Marked Assignment (TMA). Only tackle these when you feel that you have fully mastered the material in the lesson.

If it is a Self-Assessment Test, first try to check your answers by referring back to the lesson, and then compare your answers with those given right at the end of the lesson.

Tutor-Marked Assignments

After every few lessons there is a Tutor-Marked Assignment (TMA). These will thoroughly check your understanding of the preceding few lessons. You should send your answers to

your tutor, who will return your marked script, together with a set of suggested answers.

Revision

Do **not** leave all your revision until the end of the course! You will need to revise thoroughly for your examination, but frequent revision throughout the course is **essential**. Plan your revision sensibly, and re-read as you feel necessary if your knowledge is beginning to fade.

The last two TMAs in the course are a mock exam of two papers, following closely the format of the exam itself. You are recommended to study the online practice exam and mark scheme (see the section 'Past Papers' below) before attempting these TMAs and sending them to your tutor. It is also a good idea to restrict yourself to the time specified for the exam, so you have practice writing under time pressure.

Checking the Specification

As you know, this course has been written to cover the contents of the **Edexcel Specification 4CH1** which is available to download at www.ool.co.uk/0010ci.

To see this you will need Adobe Acrobat reader on your computer which you can download freely at:

http://get.adobe.com/uk/reader

In the specification, you should look in particular at:

- The Qualification Content
- The Assessment Objectives

You should check the specification online periodically throughout the course, so bookmark the Edexcel IGCSE Chemistry homepage.

The Examination

The examination you will sit consists of two papers. There is no separate practical exam and no practical coursework component; testing of practical skills is built into both of the theory papers. You will be asked practical-based questions as part of your written exam.

Chemistry Paper 1 Paper code: 4CH1/1C

This is a two-hour examination paper. The total number of marks is 110, 61% of the overall total. The paper examines all of the Specification content *except* those items printed in **bold**, and all of the assessment objectives.

Chemistry Paper 2 Paper code: 4CH1/2C

This is a 75-minute examination paper. The total number of marks is 70, 39% of the overall total. This paper examines all of the Specification content, including those items printed in **bold** and all of the assessment objectives.

From June 2019, the IGCSE qualification will be graded on a nine-grade scale from 9-1. Students whose level of achievement is below the minimum standard for Grade 1 will receive an unclassified U. Where unclassified is received it will not be recorded on the certificate.

You can see an example of both papers, and the mark-schemes used in marking them, at the end of the file which contains the current specification.

The following points apply whichever set of exams you are taking:

- In both papers there will be a range of compulsory short-answer, structured questions, which gradually increase in difficulty to ensure accessibility for less-able students, as well as to stretch more-able students.

- In both papers, students may be required to perform calculations, draw graphs and describe, explain and interpret chemical phenomena. Some of the question content may be unfamiliar to students; these questions are designed to assess data-handling skills and the ability to apply scientific principles to unfamiliar information. Questions targeted at grades 9 – 6 will include questions designed to test knowledge, understanding and skills at a higher level, including some questions requiring longer prose answers.

If you do not have access to the Internet, it is possible to buy a paper copy of the specification from Edexcel. The contact details are:

Edexcel Publications
Adamsway
Mansfield
Notts NG18 4FN

Tel: 01623 467 467
Email: publication.orders@edexcel.com

Past Papers

At the time of writing, past exam papers for the previous issue of the specification are available for download from the Edexcel website at www.ool.co.uk/0012ci.

You can also use these as exam practice. You will find the past papers under the link 'Exam paper'. You may send up to two past papers to your tutor for marking but only after you have successfully completed all the other assignments in your course.

A pair of mock examinations, marked by your tutor, is provided at the end of this course.

Your Tutor

You have plenty of resources to help you in your studies; your course file, your textbook, internet resources and your tutor. You should make good use of your tutor to help you with any difficulties that you may have during the course, especially at the start.

And finally... very good luck with your studies!

Michael Jones and Philip West