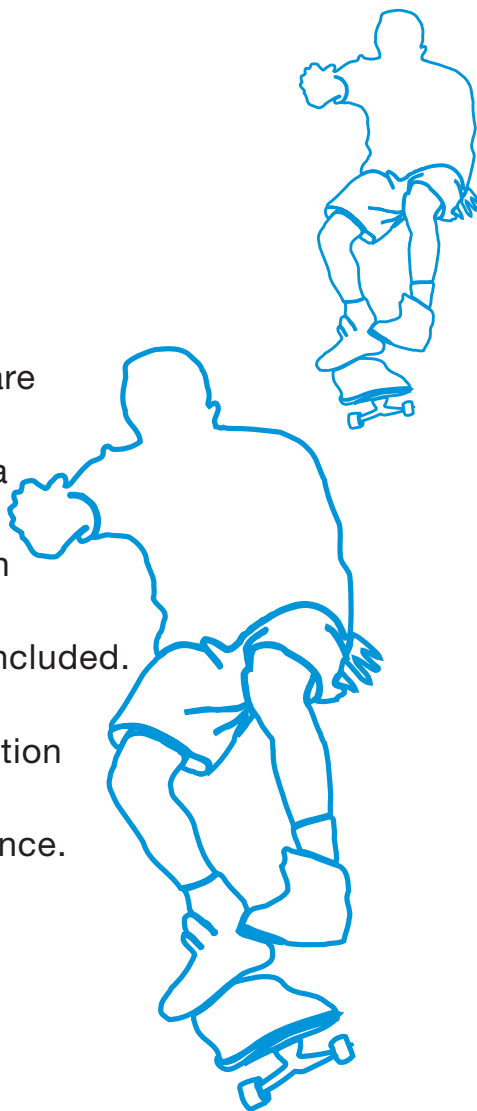


Speaker guidance

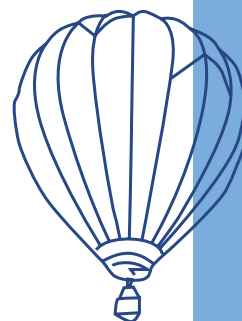
The speaker guidance notes that follow are intended to help provide you with an idea of how you might use the presentation on the CD-ROM; a complete script is NOT included.

We hope that you will adapt the presentation to your needs and to those of your audience.



A few general points to think about before you start:

- Look at all the slides beforehand. There may be some you wish to discuss in detail and others you can skip over quickly, depending on your audience and the length of your time slot.
- Run through the presentation and what you intend to say so you have an idea of how much time you require. The presentation can be adapted to fit the available time slot.
- Make sure you know how many students you will be talking to and, if possible, how many of them are considering studying chemistry or a related subject to a higher level.
- Remember to include technician level careers as well as those requiring more academic qualifications when talking about career opportunities.



If you would like some additional careers literature to support the presentation, contact:

**Royal Society of Chemistry
Education Department**

Burlington House, Piccadilly

London W1J 0BA

t: 020 7440 3344

e: education@rsc.org

You may also wish to direct students to the further information available at:

www.rsc.org/studentzone

The presentation

Slide 1

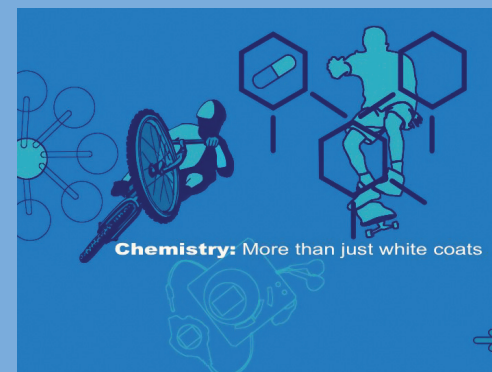
This title slide gives you an opportunity to introduce yourself (if necessary) and explain briefly what you are going to talk about.



Slide 2

All of us experience the effects and benefits of chemistry in our everyday lives, and some of us go on to use chemistry in our work. You might ask your audience why they think it is useful to learn about chemistry and what effects chemistry has on their lives.

More useful information on this topic is available on the CD-ROM in *Chemistry in our community – Additional Information*. If you wish to discuss this topic further, you might like to use the PowerPoint® presentation *Chemistry in our community* as a starting point.



Slide 3

What is chemistry or chemical science? The images of everyday objects provide a starting point for a discussion on this theme and a way to show how widely applicable chemistry is.



Slide 4

Everything we see, smell, touch or taste – you and me, CDs, the air, mobile phones, paint, food – is made of atoms. Atoms are the building blocks of nature and can combine in millions of different ways to form the materials that make up the universe. Chemical scientists study how different substances are built up, what role they play in living things and how they can be used to improve our lives.

It is important students understand that there is no fundamental difference between “artificial” and “natural” chemicals – all the objects on the screen contain chemicals.



For more information, see *Chemistry in our community* on the CD-ROM.



Slide 5

What valuable skills can you develop by studying chemistry?

Try to get some suggestions from the audience before revealing the next slide.



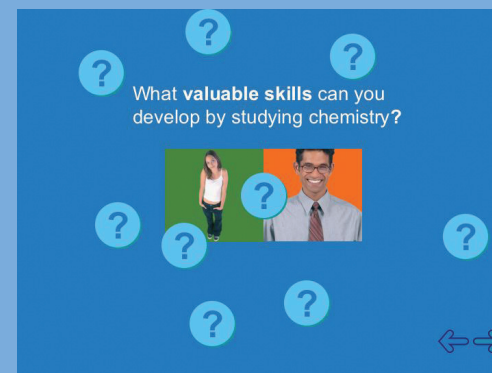
Slide 6

Research carried out by the Association of Graduate Recruiters shows that employers value transferable skills such as team working, communication, problem-solving, organisation and time management skills very highly.

Students could be asked what skills they consider important in addition to those shown on the slide and whether they think they could gain these skills by studying chemical science. A discussion about why these skills might be useful in a range of careers could follow and you might wish to use examples from your own career to illustrate the point.



Examples of ways to illustrate how the skills shown on the slide relate to chemistry and the world of work are given on the following pages.



Communication skills – group experiments, writing reports and explaining the results of an investigation to others in the class are all relevant tasks that might have arisen in science classes at school. Modern scientific research is becoming more and more interdisciplinary and chemists need to communicate with biologists, physicists and engineers, as well as with the public. They use all sorts of techniques to do this: written reports, presentations, email and telephone communication, press releases *etc.* Almost any job you can think of involves communicating in some way with colleagues, customers and/or other organisations.

ICT skills – we rely on computers more and more in all parts of our lives. New technologies and software are constantly being introduced and many jobs require knowledge of specialist software, as well as the ability to learn how to use new technologies. Chemical scientists use computers to model the structures of molecules and how they behave. They also write reports, analyse their results and communicate with others using computers.

Numeracy – students could be asked to think about experiments and investigations they have done in science classes at school. How many of them have been involved in collecting and analysing numerical data? Have they drawn and interpreted graphs, calculated concentrations *etc*? The ability to understand numerical data is important in all sorts of jobs, including many not directly linked to chemical science. For example, marketing departments need to deal with the results of market research and all sorts of statistical data, as well as budgets.

Practical skills – students will have experience of school laboratory experiments and it is easy to see how practical skills are related to a career in science. You might wish to discuss the wide range of techniques involved in different kinds of chemical research and manufacturing with reference to the corresponding range of skills needed.

Problem-solving – students could be asked for examples of things they have done that involve problem-solving. They are likely to talk about science and maths investigation work in this context but in fact the ability to think around a problem and come up with novel solutions is important in many careers outside science as well. For example, a magazine editor might be informed that problems with machinery mean the printer cannot reproduce the magazine for several weeks. Customers are waiting for their copies of the latest issue – how could the problem be solved?

Teamworking skills – students could be asked whether they can think of any jobs that do NOT involve any kind of teamwork. This should be a difficult task. Even individuals who generally work independently on their own projects rely on others for information, materials for their work, delivery, etc. Working with others is an essential part of any career.

Slide 7

This slide is designed to show the variety of careers that exist in the field of chemical science. You could:

- ask the students if there are any job titles on the slide they do not understand or want to know more about
- emphasise that the boundaries between the different sciences are becoming more and more blurred. Most research is now interdisciplinary and scientists need good communication and team working skills to make joint projects successful.



Brief descriptions of some of the jobs listed are given at the end of these notes.

Slide 8

How else could you use your skills?

This slide offers the speaker the opportunity to get the audience thinking about careers outside the laboratory before the next slide is revealed.



Some careers using chemistry

analytical chemist	process chemist
atmospheric chemist	research and development chemist
chemical engineer	pharmaceutical chemist
clinical biochemist	instrumentation technician
cosmetic scientist	materials scientist
crystallographer	nuclear scientist
environmental chemist	biochemist
forensic chemist	biotechnologist
formulation chemist	food scientist
health and safety adviser	molecular biologist
marine chemist	toxicologist
medical laboratory scientist	

How else could you use **your skills**?

Slide 9

A qualification in chemical science can open doors to a whole range of careers that may not require detailed knowledge of chemistry but do demand many of the skills chemical scientists gain during their studies.

We suggest you expand on a few of the careers shown on the slide. You could choose careers of which you have some personal experience or those in which the students are particularly interested.

**Slides 10 - 14**

Four brief profiles of people with chemical science degrees are provided within the presentation. Click on the circled numbers to read more about each person.

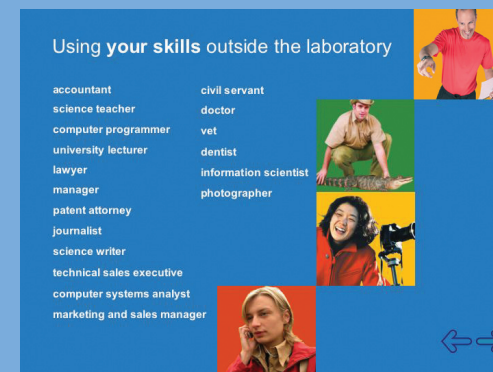
Option 5 is a link to a page on the RSC website where more profiles are available.

You must be connected to the internet to view these additional profiles.

You may prefer to allow pupils to look at the website themselves after the presentation. Alternatively, printed packs of profiles are available free from the RSC Education Department and could be used as handouts.



More detailed versions of the four profiles shown on the slides are provided at the end of these notes.



www.rsc.org/profiles



Slide 15

To find out more, have a look at

www.rsc.org/studentzone

– packed with careers information, homework help and games

www.rsc.org/profiles

– profiles of chemical scientists in all sorts of careers

www.rsc.org/chemsoc

– information about all aspects of chemistry and the chemical sciences

It is a good idea to allow time for the audience to write down contact details at the end of the presentation if they wish. Whilst they are doing this, you can answer any questions that remain.

How to find out more

Education Department
Royal Society of Chemistry
Burlington House, Piccadilly
London W1J 0BA
Tel: 020 7446 3344
Fax: 020 7317 9925
e-mail: education@rsc.org

To find out more, have a look at:

www.rsc.org/studentzone packed with careers information, homework help and games

www.rsc.org/profiles profiles of chemical scientists in all sorts of careers

www.rsc.org/chemsoc information about all aspects of chemistry and the chemical sciences

RSC | Advancing the Chemical Sciences



Web link



End
PowerPoint
show

Additional information

You may wish to use the following descriptions to help you talk around the slide entitled **Some careers using chemistry.**

Analytical chemists monitor and control processes and products to ensure quality and safety. They work in all sorts of environments, from government agencies to hospitals to industrial research laboratories. They might monitor air quality or the composition of foods, check for the presence of illegal drugs or help research chemists to identify new compounds they have synthesised.

Atmospheric chemists are interested in the chemical composition of the atmosphere, how its components interact with each other and how changes in the

atmosphere can affect our climate. They use chemical analysis to help them understand how the atmosphere has changed since the earth's formation and how it is changing today.

Chemical engineers turn laboratory experiments into efficient pilot and full scale industrial processes. They are not only involved with the science behind a process, but are also concerned with commercial viability, health and safety and environmental issues.

Clinical biochemists develop and manage analytical techniques, usually for use on blood and other bodily fluids. They interpret the results of their analyses and advise on disease diagnosis and the planning and monitoring of treatment.

Cosmetic scientists research the structure and properties of hair, skin, teeth *etc* and how these materials react with a variety of chemicals. They use this information to develop products that cosmetically enhance our appearance without harming us.

Crystallographers grow crystals and analyse them to determine their structures. Crystals are used in a wide range of applications, such as display screen technology or sunglasses.

Development chemists convert the ideas that arise from basic research into products for the consumer. They are involved in scaling up processes developed during initial research and adjusting the product to match the needs of the customer.

Environmental chemists collect and analyse samples of air, water, soil *etc* to ensure the safety of our water supply and to monitor soil and air quality. They then formulate appropriate treatments for any contamination.

Forensic chemists collect samples of all sorts of material, often from scenes of crime. They carry out extremely detailed analyses of these samples and usually summarise their findings in a written report. They are sometimes required to appear in court.

Formulation chemists mix compounds that do not react with each other in order to develop products that match customer specifications. They work on a wide range of products, including toiletries (*eg* shampoo, toothpaste), paints, cosmetics and adhesives.

Health and safety advisers

carry out risk assessments, safety inspections and accident investigations. They also deal with chemical waste disposal and other environmental issues related to chemical processes.

Marine chemists study how the input of all sorts of chemicals affects the oceans, the formation of the sea floor and seawater sediments. They research how the chemistry of the oceans affects and is affected by geological, physical and biological factors, and by pollutants.

Medical laboratory

scientists carry out tests on bodily fluids and tissues to check for cell abnormalities, infections *etc.* They sometimes examine tissues from post-mortem operations as well as specimens from living people. They are not usually involved in the diagnosis of disease but doctors rely on their results when making diagnoses.

Career profiles

Lab chemist

Pharmaceutical research

- As a medicinal chemist, I use my knowledge of chemistry, biochemistry and physiology to generate solutions to health-related problems.
- More explicitly, I work on the synthesis of new drugs for treating disease.
- In my day to day job, I synthesise a whole range of test molecules. Once I have made a sufficient amount of the pure final compounds, I forward them to biologists for screening.
- When the results from the screening are returned, a discussion with a supervisor will decide the best way forward. Getting biological data back on something I have personally made is always exciting!
- The work I'm involved in is at the cutting edge of drug discovery. As a medicinal chemist in industry, you may well be working on the next billion dollar blockbuster!
- The best bit about this job is that it is neither 100% office nor 100% laboratory based. I do a variety of work, and no day is ever the same. I have to think carefully about what it is I am doing all the time.

My qualifications:

MChem in Medicinal Chemistry.

Teacher

Director of studies and head of science

- As a teacher, much of my time is spent preparing and planning lessons, teaching chemistry to students between the ages of 11 and 18, and marking and assessing their work.
- I also manage the science department in terms of teaching and learning. This involves monitoring the standards achieved by staff and students, as well as managing and supporting teachers and technicians.
- I'm also responsible for academic matters across the whole school, which include teaching and learning standards, academic administration (and inevitably discipline), as well as liaising with all heads of departments.
- When I first left university I went to work in industry. Helping to train apprentices during this time made me realise I'd enjoy teaching so I made enquiries about a teaching qualification. Shortly after this I was offered a teaching post out of the blue, accepted it and haven't regretted it for one second!
- What I love about teaching is that it really is never the same two days in a row – every day is unique.

My qualifications:

BSc (honours) degree in Chemistry.

PhD in Chemistry.

PGCE (Postgraduate Certificate in Education) in Chemistry and Science.

Patent attorney

- As a patent attorney I work to obtain protection for inventions by writing and prosecuting patent applications. Granted patents give the patent owners the right to stop other people from using their patented inventions.
- I spend much of my time liaising with inventors from the pharmaceutical and biotechnology industries. During such meetings, I discuss the invention they wish to patent and their aims in obtaining protection for the invention. My scientific background enables me to understand the invention and communicate well with its inventors, which is vital to my work.
- I then draft a patent application, which contains a description and a legal definition of the invention. This patent application is filed at, and prosecuted before various patent offices.
- Patents are national rights so patent protection is usually sought at a number of foreign patent offices to prevent inventions being used by people in different countries.
- As well as drafting and prosecuting patent applications I advise clients on their patent strategy, *ie* where to file patent applications and how to defend patents from attack.
- I chose patents because I wanted a career that would draw on my science background and would also make use of my communication skills.

My qualifications:

BSc (double honours) degree in Chemistry and Biochemistry.

PhD in Bio-organic Chemistry.

Postgraduate Certificate in Intellectual Property.

Patent Agents' Practice

qualification (one of four UK final exams required to become a

Chartered Patent Attourney).

European Qualifying Exams (to become a European Patent

Attorney).

Marketing project manager

- Marketing is about identifying the particular needs and goals of a customer and producing a product that satisfies these criteria better than any of your competitors' products.
- Working in marketing involves undertaking market research on potential customers, analysing their needs and then making decisions about the product design, pricing, promotion and distribution accordingly.
- As a marketing project manager I oversee marketing projects all the way through from the initial idea to the final launch.
- My working day involves many meetings and discussions to develop and progress new ideas, documents, promotions and proposals. However, a typical day involves a variety of activities, which depend on the stage of the project.
- The aspect of my job I enjoy most is the variety – I work with people in different countries, coordinating activities across departments nationally and internationally. Every day brings different challenges!
- I market paints. My science background is essential because it enables me to understand the technical issues involved in the development and production of the products I'm marketing.

My qualifications:

Masters degree in Chemical Engineering.

Advanced Certificate in Marketing from the CIM (Chartered Institute of Marketing).

Postgraduate Diploma in Marketing from the CIM.

If you would like more detailed information on the profiles covered, please contact the RSC for a profiles pack or go to www.rsc.org/profiles.