

**AN EXCITING
CAREER AHEAD.**

AT SCHOOL

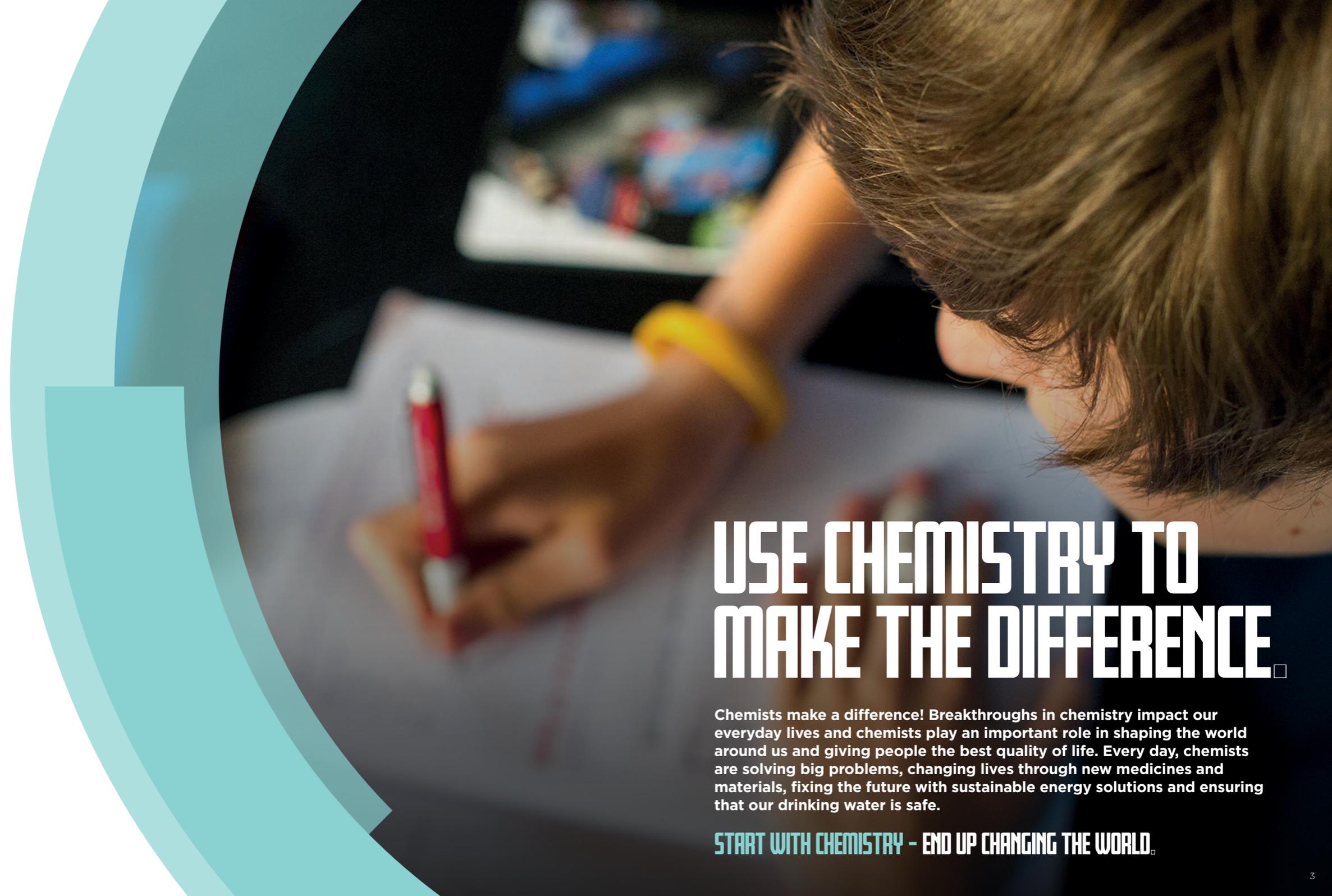
CHEMISTRY.
**MAKING THE
DIFFERENCE.**

WHAT IS CHEMISTRY?

From the moment you're born you're surrounded by chemistry – the air you breathe, the food you eat and the clothes you wear – they're all chemistry. Chemistry is the study of substances: what they're made of, how they interact with each other and the role they play in living things.

From research in space to the depths of the oceans, chemistry helps you understand the world around you. Chemistry also forms the basis of other related subjects such as:

- environmental chemistry – understanding and solving challenges such as climate change, pollution or waste management on a molecular level.
- materials chemistry – looking at the chemical structure of materials and using this knowledge to develop the materials of the future.
- chemical engineering – producing chemical products on an industrial scale.
- biological sciences – such as biochemistry, molecular biology and pharmacology.



USE CHEMISTRY TO MAKE THE DIFFERENCE.

Chemists make a difference! Breakthroughs in chemistry impact our everyday lives and chemists play an important role in shaping the world around us and giving people the best quality of life. Every day, chemists are solving big problems, changing lives through new medicines and materials, fixing the future with sustainable energy solutions and ensuring that our drinking water is safe.

START WITH CHEMISTRY – END UP CHANGING THE WORLD.

WHY STUDY CHEMISTRY?

Chemistry-based jobs are interesting and rewarding with many opportunities available in research, education, fieldwork and other industries you might not have thought of.

Lots of chemists work outside traditional chemistry careers because the skills you develop from a chemistry qualification can be applied to many areas.

REASONS TO STUDY CHEMISTRY

- You will understand more about the world around you and how things are made.
- You can help feed the world and have a positive impact on our environment.
- It's a core subject that enables you to cross over to the other sciences or venture into biochemistry, geochemistry, chemical engineering or physical chemistry.
- You will learn skills such as problem solving plus analytical and logical thinking – these skills open up lots of careers.
- You just love chemistry!

CHEMISTRY. DEVELOPING YOUR SKILLS.

Whatever your plans for the future, having a chemistry qualification could help. It will increase your scientific knowledge and help you to understand why and how things happen. It will also give you practical, hands-on experience, plus you'll gain skills that are sought after by all kinds of employers.

Chemistry is central to many sectors such as medicines and healthcare, food production, cosmetics and household goods, and energy and the environment.

In the future, people will be needed who are good at explaining how things work and solving the chemical, biological and engineering challenges in these sectors. There will be a demand for people who can design and develop products for a better future. A qualification in chemistry gives you these skills and will be a valuable asset.

Chemical scientists and technicians possess a range of skills including problem solving, logical thinking, data handling and analysis, team working, report writing and laboratory techniques. These skills can open the door to job opportunities.

If you'd prefer to learn outside of the classroom, develop your skills and gain on-the-job experience, a work-based qualification is a great way to get started in chemistry.

Find out about work-based chemistry qualifications and apprenticeships. [rsc.li/earn-while-you-learn](https://www.rsc.li/earn-while-you-learn)

MARGOT WENZEL

RESEARCH INNOVATIONS MANAGER,
POLYMATERIA

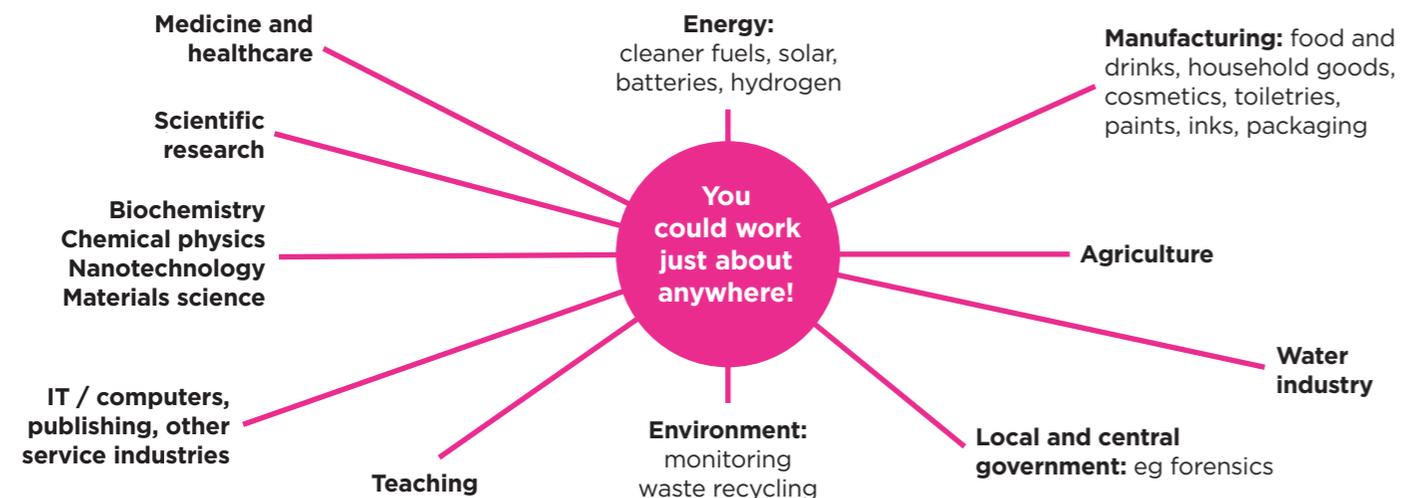
'What I love about my job is that I get to apply chemistry to real-life problems, in this case, fighting in the war on plastics.'

'Some days, I'm going to spend my day in front of a computer working on reports and meetings or reading the latest scientific articles. Other days, I'm going to go to the lab, analyse the properties of plastic we've added new molecules to, or even pick up and develop new molecules that we could add to the plastic for future prototypes.'

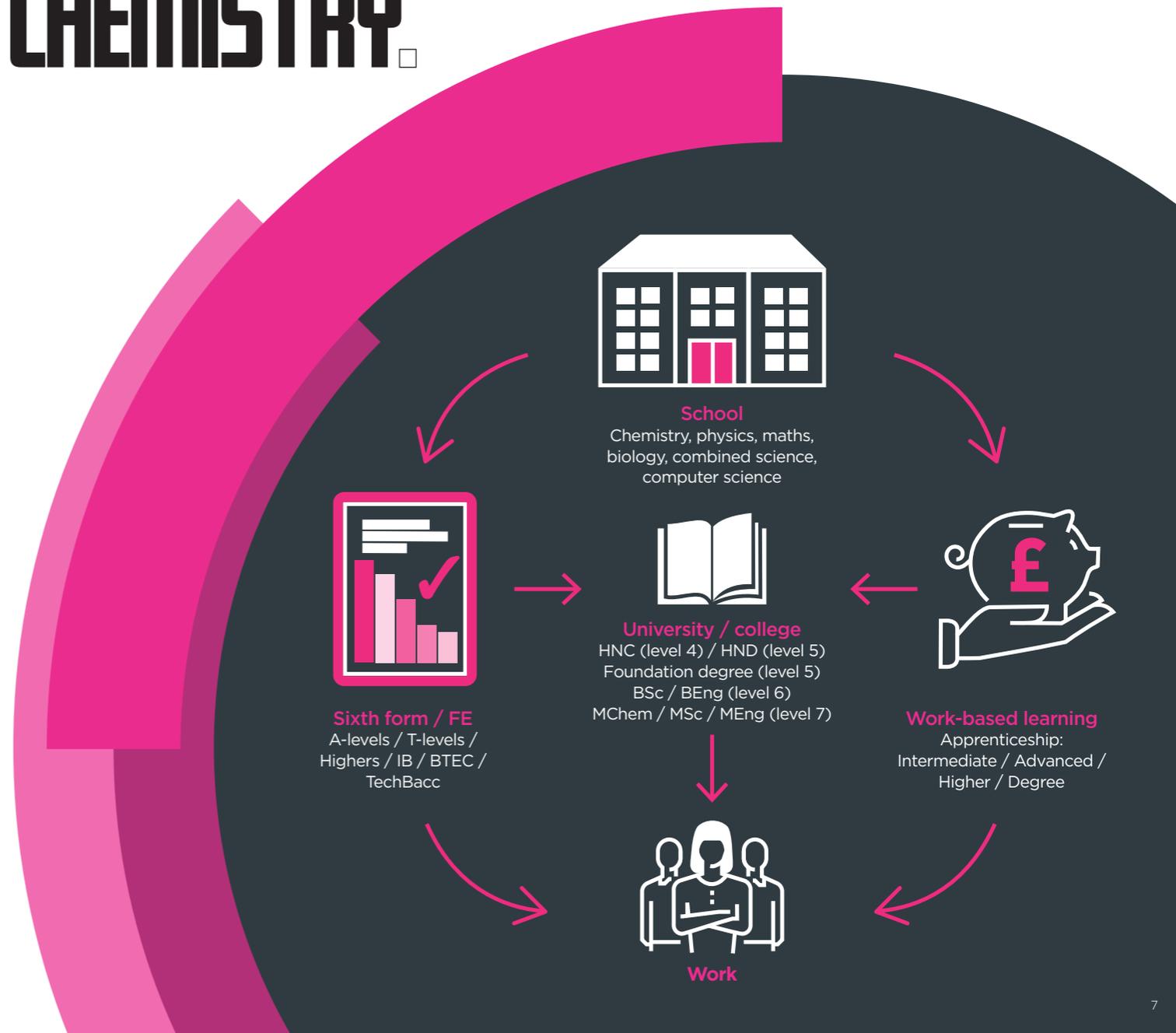


WHERE CHEMISTRY COULD TAKE YOU.

A qualification in chemistry gives you different options. A background in the chemical sciences will help you to build up a range of transferrable skills such as problem solving, data analysis, teamwork, computer skills and communication skills - both verbal and written. Skills like these can be applied in many different areas.



GETTING INTO CHEMISTRY.



TAKE CHEMISTRY AND YOU COULD...

CHANGE LIVES

ERIN MACIEJEWSKI

PROCESS CHEMIST, GLAXOSMITHKLINE

'It was amazing to know that my work contributed to the approval of a first-in-class treatment to help adults with HIV infections that are resistant to antiretroviral therapies, which are alternative medicines that stop the virus replicating inside the body.'

'Behind every patient there is always a network of family and friends who can take comfort in the knowledge that improved treatment is continually being developed through our shared knowledge of the sciences. I'm fortunate enough to work within an area where, every day, I see these novel molecules being developed for use as new medicines.'



FIX THE FUTURE

CELINE MOREIRA, MASC

ANALYTICAL TECHNICIAN, POLYMATERIA

'We are tackling one of the biggest problems that we have in our modern society which is plastic pollution and knowing all the harm it does to the environment and to the people that live within that type of environment is really important to me and every day it motivates me.'

'I work as an analytical technician at Polymateria. We try and deal with the crisis around plastic pollution through our advanced science and technology where we try and modify the molecular structure of plastics, using chemistry, so that they can biodegrade in the natural environment.'



BE THE CATALYST

CHARLES RENNEY

PATENT ATTORNEY, ABEL & IMRAY

'The thing that motivates me in my job is that, as a patent attorney, you have a real impact on bringing new inventions to market which can change people's lives and wellbeing.'

'I studied chemistry at university, and this is what ultimately led me on to a career as a patent attorney as it was able to provide me with some exposure to research but outside the lab.'

'Abel & Imray helps get legal protection for new inventions for companies and inventors. A patent will allow them to get protection for their product and prevent others from making and selling that product for a short period of time. One day, I may be out meeting an inventor to discuss their new inventions. Another day, I may be at the European Patent Office defending a client's patent.'



CHEMISTRY. SHAPING YOUR FUTURE.

OPTIONS AT SCHOOL - WHAT DO I NEED TO DO NEXT?

To give you the best options for a future in chemistry, study as much science and maths as you can while at school. Discuss your options with your teachers and see what's right for you:

- Ask what science courses are available at your school.
- Ask what the different courses involve.

You can also start thinking about your future in chemistry by asking the careers adviser at your school for advice and answers to any of your careers questions, or by visiting our *A future in chemistry* website. [rsc.li/career-options](https://www.rsc.li/career-options)

Remember, whatever you do in the future, having a good knowledge of science and maths is useful to understand the world around you and for a wide range of careers, even outside science.

WORK EXPERIENCE.

If you're interested in working in chemistry, why not try and get work experience during the school holidays?

Explore our top tips for finding work experience on *A future in chemistry*. [rsc.li/work-experience](https://www.rsc.li/work-experience)

WHAT SCIENCE COURSES ARE THERE?

This depends on where you are. It is likely to be GCSEs in England, Wales and Northern Ireland. In Scotland, you will take National Qualifications.

All the qualifications can be studied with different levels of content. The more science you study, the more options you'll have in the future.

You might want to choose a second or third science alongside chemistry. Chemistry, biology, physics and maths are some of the subjects that appear most often in university entry requirements for a variety of courses.

If you're undecided about your future plans, then studying chemistry can help you keep your options open.

AFTER GCSEs / NATIONALS.

After getting a good foundation in the sciences and maths during your GCSEs or National Qualifications, the first step towards continuing with chemistry is to think about how much studying you wish to do and if you wish to combine work and study.

Whichever you decide, make sure you pick options with lots of chemistry content. Maths is a good subject to study alongside chemistry at any level, as a good understanding of maths will always help. An A-level or equivalent in maths is sometimes a requirement for chemistry degrees; you will need to check the entry requirements.

The options below each offer a different way to learn. Find out more on the next page to see which one is right for you.

- Apprenticeships: Advanced / Foundation
- Applied or technical qualifications: T-levels / BTEC / Applied Generals / SVQs
- Academic qualifications: A-levels / Scottish Highers / International Baccalaureate

OPTIONS AFTER GCSEs / NATIONALS

When thinking about what to do next, bear in mind what you enjoy, what's important to you and what your strengths are.

There are a range of qualifications available at level 3 (level 6 in Scotland). Which one you choose may depend on where you live and what is available to you locally.

ACADEMIC QUALIFICATIONS

Academic qualifications will take you deeper into some of the things you've been studying up. Expect to be doing a bit more maths and to develop a deeper knowledge of the subject. These qualifications prepare you for further study at bachelor's or integrated master's degree level. Alternatively, you can go straight into the workplace or take an apprenticeship after this stage. These qualifications take two years to complete and can be studied through a school, college or training provider. They include: A-levels (England, Northern Ireland and Wales), Scottish Highers and the International Baccalaureate Diploma.

Continuing to study an academic qualification in chemistry will give you a good foundation whether you want to go into chemistry or another science. It will also give you helpful reasoning and analytical skills which are applicable in different areas.

APPLIED OR TECHNICAL QUALIFICATIONS

Applied or technical qualifications are developed with the help of employers. They equip you with practical skills for employment and several higher education options. Some qualifications include a work placement in a particular sector. Some examples are Applied General Qualifications such as Applied Science BTEC (UK), the Science T-level (England) and Laboratory Skills SVQ (Scotland). Some of these qualifications are more likely to be offered by a college or training provider than by a school, so it is worth finding out what a range of providers have to offer.

APPRENTICESHIPS

You can also go straight into the workplace and earn while you learn through an apprenticeship. Find out more about apprenticeships on the next page.



APPRENTICESHIPS

Apprenticeships lead to a range of fulfilling and essential roles in society. As an apprentice, your training and work experience will help you stand out in the eyes of future employers.

Apprenticeships are training programmes that enable you to work as a paid employee at a company while studying, giving you the skills, experience and knowledge that you need to progress to employment. They can lead to applied and technical roles as well as research-based, graduate or postgraduate roles, depending on the level of the apprenticeship taken. On an apprenticeship scheme, you might spend 80% of your time working at your company and 20% of your time studying through a university, college or other provider, which could lead to a formal qualification such as a foundation degree.

Apprenticeships enable you to work alongside skilled professionals who can train you on the job, allowing you to develop a wide skillset and build up the experience that you can apply in a real-life environment. Both the work and educational sides of apprenticeships are built to complement each other, enabling you to apply your theoretical knowledge from your assignments into the work that you do.

If you enjoy practical, hands-on learning and wish to earn money whilst you combine work and study, an apprenticeship is a good option for you to consider. You will be paid at least the minimum wage for apprentices (£4.30p/h <https://www.gov.uk/become-apprentice/pay-and-conditions>). Entry requirements vary, so check which qualifications or grades are needed to access the apprenticeship you're interested in.

There is the option to work through as many of the different levels of apprenticeships as you wish to if you can meet the entry requirements.

DIFFERENT TYPES OF APPRENTICESHIPS

Advanced apprenticeships are level 3 programmes that can be taken straight after GCSEs. They are also referred to as apprenticeship (Wales), and level 3 apprenticeships (Northern Ireland). In Scotland, the equivalent level 3 programme is called a foundation apprenticeship, at Scottish credit and qualification framework (SCQF) level 6. These types of programmes can be taken straight after GCSEs or National Qualifications. They can incorporate a qualification such as an Applied Science BTEC (England, Wales, Northern Ireland) or Highers (Scotland). These apprenticeships can lead to higher education and roles such as laboratory technician.

Higher apprenticeships (England, Wales and Northern Ireland) and modern apprenticeships (Scotland) can be taken straight after Scottish Highers, A-levels, BTECs or equivalents. Higher apprenticeships can be level 4 or level 5, and can incorporate a qualification such as a foundation degree (FdSc), HND or HNC. In Northern Ireland, higher apprenticeships can encompass levels 4-7. Modern apprenticeships (Scotland) can include SVQs from levels 5-12 (SCQF) but most modern apprenticeships are at levels 6 and 7 (SCQF). Qualifications at these levels can lead to applied and technical roles such as chemical technician.

Degree apprenticeships (England, Wales and Northern Ireland) or graduate apprenticeships (Scotland) have a range of entry and exit points. They are level 6 programmes (level 9, 10 or 11 in Scotland) that might incorporate a bachelor's degree (BSc) and could lead to applied, technical or graduate level roles.

Master's level apprenticeships (England, Wales and Northern Ireland) or graduate apprenticeships (Scotland) are level 7 programmes (level 11 in Scotland) that could lead to applied, technical, graduate or postgraduate level roles.



OPTIONS FOR HIGHER EDUCATION

Looking further into the future, there are a range of options once you've completed your A-levels or equivalent.

APPLIED OR TECHNICAL QUALIFICATIONS

These are work-based qualifications that prepare you well for a technical role in the chemical sciences, as well as potentially being a stepping stone to a bachelor's degree.

Entry requirements vary, and these courses can be more accessible than full degrees. These qualifications can be studied full time in college or university, or part time, giving more flexibility. People who study these qualifications may be working already or taking them as part of an apprenticeship.

HIGHER NATIONAL CERTIFICATES (HNCs) AND HIGHER NATIONAL DIPLOMAS (HNDs)

These are qualifications developed by awarding bodies (exam boards) and are usually offered by colleges and other training providers. Chemistry-related courses include analytical science, applied science and chemical science for industry. An HNC will take one year to complete if studied full time and an HND will take two years.

FOUNDATION DEGREES

Foundation degrees are offered by universities and other higher education establishments in areas such as applied chemistry, analytical chemistry, forensic science and pharmaceutical science. They take two years to complete if studied full time.

For more information about your different options and how to apply for them, visit *A future in chemistry*. [rsc.li/options-for-HE](https://www.rsc.li/options-for-HE)

BACHELOR'S AND INTEGRATED MASTER'S DEGREES

Bachelor's or integrated master's degrees in chemistry offer in-depth training in both theoretical and practical chemistry. These courses can take three or four years to complete, or longer, leading to a bachelor's degree qualification at level 6 (level 9/10 in Scotland) or a master's degree qualification at level 7 (level 11 in Scotland).

Entry requirements vary between universities and some courses are more competitive than others, requiring higher grades.

DO I NEED MATHS TO STUDY CHEMISTRY AT UNIVERSITY?

Maths is an important part of nearly all chemistry degree courses. However, an A-level (or equivalent) in maths isn't always an entry requirement. You may need to take a course in maths once you reach university - most universities will provide additional maths support during your degree.

ACCREDITED COURSES

If you're looking for a degree programme with a lot of chemistry content that will provide you with the right skills for future employment, check which courses are accredited by the Royal Society of Chemistry. You can find RSC-accredited degree courses by visiting: [rsc.li/accredited-courses](https://www.rsc.li/accredited-courses)



PREFERRED A-LEVEL SUBJECTS FOR BACHELOR'S AND INTEGRATED MASTER'S DEGREES

WHAT NEXT?

Read our *After school* booklet for further information about different routes into the chemical sciences and the variety of job roles that are available.

For further information on job roles within the chemical sciences, visit: [rsc.li/career-jobs](https://www.rsc.li/career-jobs)

For more information about higher education options, visit: [rsc.li/options-for-HE](https://www.rsc.li/options-for-HE)

For further information about apprenticeships, visit: [rsc.li/career-earn](https://www.rsc.li/career-earn)

To see the list of RSC-accredited apprenticeship providers, visit: [rsc.li/search-apply](https://www.rsc.li/search-apply)

For further information about going to university, visit: [rsc.li/going-university](https://www.rsc.li/going-university)

| | Course | Preferred A-levels | | |
|-----------------------------|--|--------------------|---------------------|-----------------|
| | | | | |
| Chemical sciences | Analytical chemistry Applied chemistry Biochemistry Chemistry Forensic and environmental chemistry Green chemistry Materials chemistry Medicinal chemistry Nanotechnology / science Natural sciences Pharmaceutical chemistry Computational chemistry and modelling (MSc level) | Chemistry | Maths | Physics |
| Medicine | Dentistry Medicine Optometry Veterinary science | Chemistry | Biology | Maths |
| Earth science | Environmental / earth science Geology Meteorology and climate science | Physics | Chemistry | Maths |
| Food science | Agricultural science Food and nutrition | Biology | Chemistry / physics | Maths |
| Biological sciences | Biology Ecology Environmental science Evolution Forensic biology Genetics Molecular and cellular biology Plant science | Biology | Chemistry | Maths / physics |
| Medical sciences | Biomedical / healthcare science Pharmacy Pharmacology | Chemistry | Biology | Physics / maths |
| Health | Anatomical sciences Immunology and microbiology | Chemistry | Biology | Physics / maths |
| Physics | Chemical physics | Physics | Chemistry | Maths |
| Chemical engineering | Chemical engineering | Maths | Physics | Chemistry |

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