

**AN EXCITING
CAREER AHEAD.**

CHEMISTRY
**MAKING THE
DIFFERENCE.**

AFTER SCHOOL

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.

For the latest information, check out the Royal Society of Chemistry's chemistry careers website, *A future in chemistry*: rsc.li/future

USE CHEMISTRY TO MAKE THE DIFFERENCE.

Chemists make a difference! Breakthroughs in chemistry impact our lives and chemists play an important role in shaping the world around us, solving big problems and changing lives through new medicines and materials, as well as fixing the future with sustainable energy sources.

START WITH CHEMISTRY – END UP CHANGING THE WORLD.

WHY CHOOSE 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 of expertise.

REASONS TO STUDY CHEMISTRY

- You will understand 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 core 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!

WHERE CHEMISTRY COULD TAKE YOU

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

Chemistry is central to many sectors and employers such as pharmaceuticals, healthcare, biotechnology, agri-food and the green economy.

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.

Developing your skills by continuing with a higher education chemistry qualification will help you stand out from the crowd and get the job you want. Some qualifications offer on-the-job experience too.

With a chemistry qualification, you could:

- change lives by developing new molecules that can be transformed into life-saving medicines and vaccines.
- fix the future by finding new ways to tackle climate change and to cope with increasing demands for energy, food, water and other scarce natural resources.
- innovate industry by developing sustainable products and materials with applications from car batteries to food packaging.



LEWIS HUDSPITH
RESEARCH ASSISTANT, OWLSTONE MEDICAL

'Every day brings something new and it's a very fast-paced environment where I'm constantly learning and I feel like I'm actually making a difference to the world of medicine and disease detection as well, as we're working on really cutting-edge science here. It's a really exciting place to be.'

'I spend a lot of time in the lab. I'm working on TD GC-MS instruments, which are how we analyse our breath samples, separate the breath into its individual components and analyse potential biomarkers for disease.'

- challenge opinions by promoting scientific research and campaigning for policy changes.
- be the catalyst by inspiring others through teaching chemistry.
- work outside the lab in areas such as law, finance, journalism, the government and teaching.

If you're interested in seeing where people who've chosen chemistry work, see *What do graduates do?* and *A future in chemistry*.

rsc.li/future

prospects.ac.uk/careers-advice/what-can-i-do-with-my-degree/chemistry

Find out about work-based chemistry qualifications and apprenticeships on the link below.

rsc.li/earn-while-you-learn



WHAT JOBS DO CHEMISTRY-USING PROFESSIONALS DO?

With a chemical sciences background, you could ensure our food and water are safe, help to solve crime or communicate scientific ideas to the public – there are many more options out there!

WHAT JOB COULD YOU DO WITH A CHEMISTRY QUALIFICATION?

Examples of jobs directly related to a chemical science qualification:

- **Analytical chemists** investigate substances to identify their chemical composition and properties. You could be employed in a public or private sector organisation, for example an environmental agency or food company.
- **Environmental scientists** examine the presence and impact of certain chemicals in soil, water and air and investigate their effects on human health and organisms in the environment.
- **Laboratory technicians** are employed by different commercial and public organisations, including hospitals. What you do will depend on where you work. For example, within the water industry, you will test for impurities to ensure tap water is safe to drink.
- **Nanotechnologists** design, test and analyse the effects of nanomaterials (one-millionth of a millimetre) such as their effects on greenhouse gas emissions. You could work in universities, hospitals, industry and government laboratories.

- **Medicinal/research/synthetic-organic chemists** develop and test compounds with the aim of creating medicines to treat diseases. You could work in places such as pharmaceutical companies, universities and medical charities.
- **Toxicologists** test and assess the risk chemicals pose to human health and the environment, ensuring they are safe to use. You could work in a range of commercial and public organisations.

Examples of jobs where a chemical sciences qualification can be applied outside of the lab:

- **Science editors, publishers or writers** advance the chemical sciences by editing, publishing or writing about the latest cutting-edge research in scientific journals and books.
- **Patent attorneys** help clients get legal protection for their new inventions and medicines.
- **Policy advisers** brief their organisation's decision-makers about the latest scientific research to inform their policies and lobby governments to make changes to policies and laws.

For more jobs where you need a chemistry qualification, visit the job profiles on *A future in chemistry*. [rsc.li/job-profiles](https://www.rsc.li/job-profiles)

For more information on job roles, you can also visit *Prospects*. <https://www.prospects.ac.uk/>

TILLY WOODLAND, AMASC ANALYTICAL CHEMIST, OWLSTONE MEDICAL

'Chemistry gave me a direction when I didn't really know what I wanted to do.

'I'm very proud to be a chemist. When people ask me what I do for my job and I tell them that we're working towards the diagnosis of diseases like asthma and cancer, they all say 'wow' because they can tell that it's such a world-changing thing to be involved in.'

EMPLOYABILITY AND EARNING

There are an estimated 275,000 chemistry-using professionals in the UK so there's a lot of scope for employability within the chemical sciences. In 2019, the contribution of chemistry-using professionals to UK GDP was estimated to be £87 billion.

HOW MUCH WILL I EARN AND HOW LIKELY AM I TO GET A JOB?

Salaries depend on a large number of factors, including the area of chemistry you work in, your qualifications, your level of responsibility, your location, experience, and the size and type of your organisation. The annual median* salary of members of the Royal Society of Chemistry is £48,000 and the annual median salary for those aged 20-24 is £26,000, both to the nearest £100.**

The job profiles on A future in chemistry include salary information and it is also helpful to look at job advertisements to get an idea of pay, for example on *Chemistry World Jobs*. Glassdoor is a useful website for finding out further information about salaries. Career websites and magazines are another good place to find out which job roles are available and how much they pay.

2021 pay and reward survey results** showed that 70% of respondents felt secure in their job, increasing from 65% in 2019, showing that the chemical sciences has a good degree of

USEFUL WEBSITES

Chemistry World Jobs
jobs.chemistryworld.com

A future in chemistry
rsc.li/career-earn

Glassdoor
<https://www.glassdoor.co.uk/Salaries/index.htm>

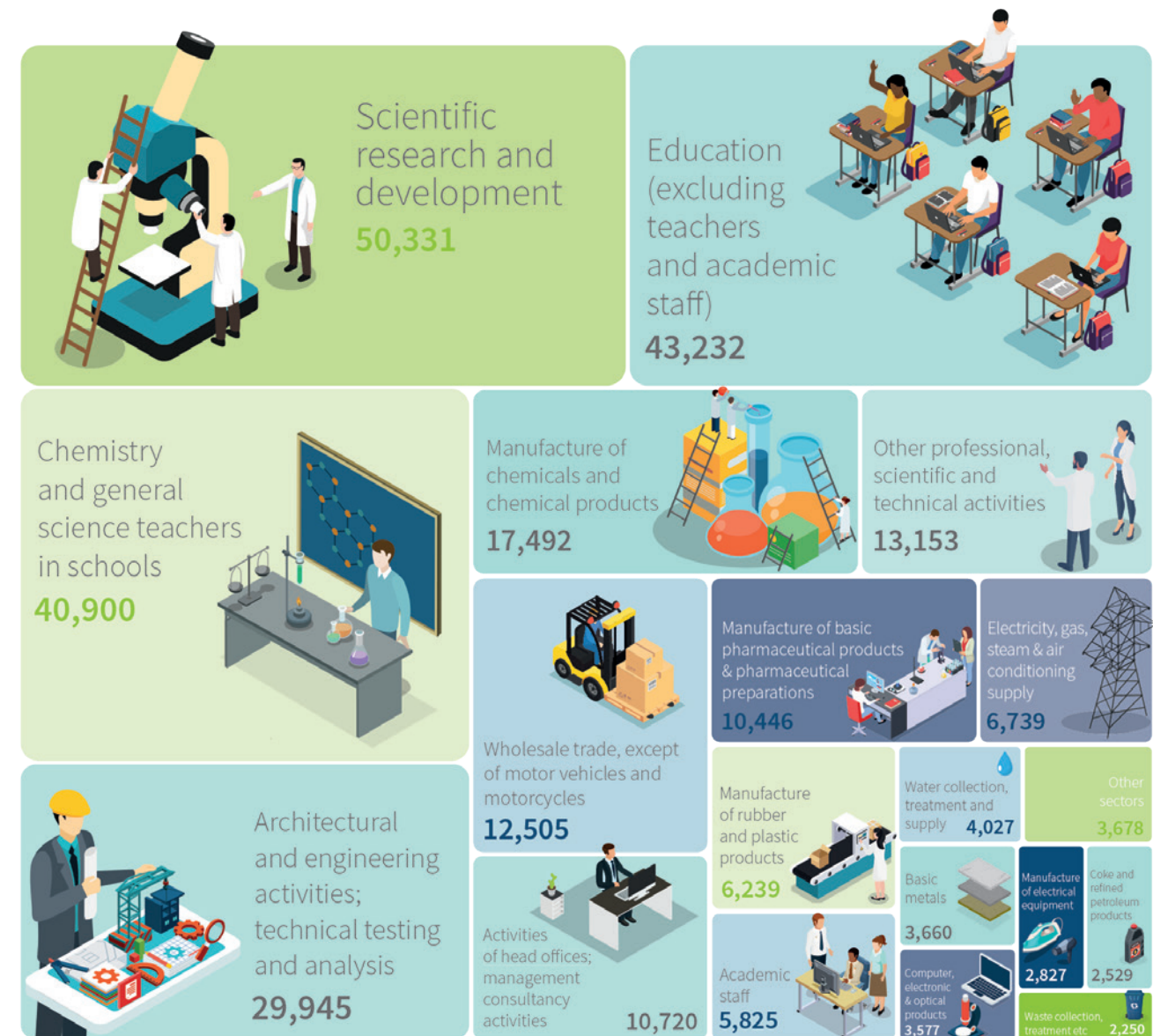
What do graduates do?
<https://luminate.prospects.ac.uk/what-dograduates-do>

stability and employability. According to 2020/21's *What do graduates do?* report, 85.2% of chemistry graduates are either working full time, working and studying, or doing further study 15 months after graduation, with a large proportion of chemistry graduates (39.6%) working as science professionals, associate professionals and technicians.

* The median salary is the number in the middle of the distribution of the salaries reported, meaning that half of the salaries reported are less than this number and half are higher.

**Results based on the 2021 pay and reward survey of 4,298 members of the Royal Society of Chemistry who responded to the 2021 survey with profiles representative of current membership.

WHERE DO CHEMISTRY-USING PROFESSIONALS WORK?



CHEMISTRY. SHAPING YOUR FUTURE.

WHAT DO I NEED TO DO NEXT?

What you do next will be linked to the choices you previously made at school, your interests, your qualifications and your grades. Discuss your options with your teachers and career advisers to help you to decide what's right for you. You can also start thinking about a future in chemistry by visiting our website.

rsc.li/career-options

If you wish to continue with chemistry, having a knowledge of science will be useful for a wide range of careers, even outside of science.

WORK EXPERIENCE

If you're interested in working in chemistry, why not try and get work experience during the school or college holidays? Explore top tips for finding work experience on *A future in chemistry*.

rsc.li/work-experience

OPTIONS AFTER SCHOOL

There are different routes into the chemical sciences with overlap between them (see the higher education options table on page 13). Most people go into the chemical sciences by studying a bachelor's or integrated master's degree. However, that is just one of several other routes to consider:

- academic-based higher education qualifications, such as studying at a university for a bachelor's or integrated master's degree.
- technical or applied higher education qualifications, such as an HNC, HND or foundation degree.
- work-based, such as an apprenticeship which includes formal learning.



JOSEPH GOODWIN
LABORATORY ANALYST AND HIGHER DEGREE
APPRENTICE, THAMES WATER

'I'm working towards a chemistry degree which goes well with my job. I get to do the practical aspect at work and then the theoretical aspect at university. I also get on-the-job training while getting paid to do this.'

CHOOSING WHERE TO STUDY

Your choice depends on what your preferences are in terms of location, course content and whether you'd like to combine work with studying. There are likely to be many institutions close to home that offer chemistry and closely related courses at degree level. For technical courses, look at colleges and universities.

Some things you may wish to consider when choosing where to study are:

- the courses available and entry requirements.
- whether the programme combines working with studying.
- the chemistry content that's included on the programme.
- whether the programme will include a qualification and, if so, the level of the qualification.
- the location and duration of the programme.
- for universities: whether it's a campus or city university.
- how the programme is assessed.
- the accommodation options and costs.

For more information about higher education options, visit:

rsc.li/options-for-HE

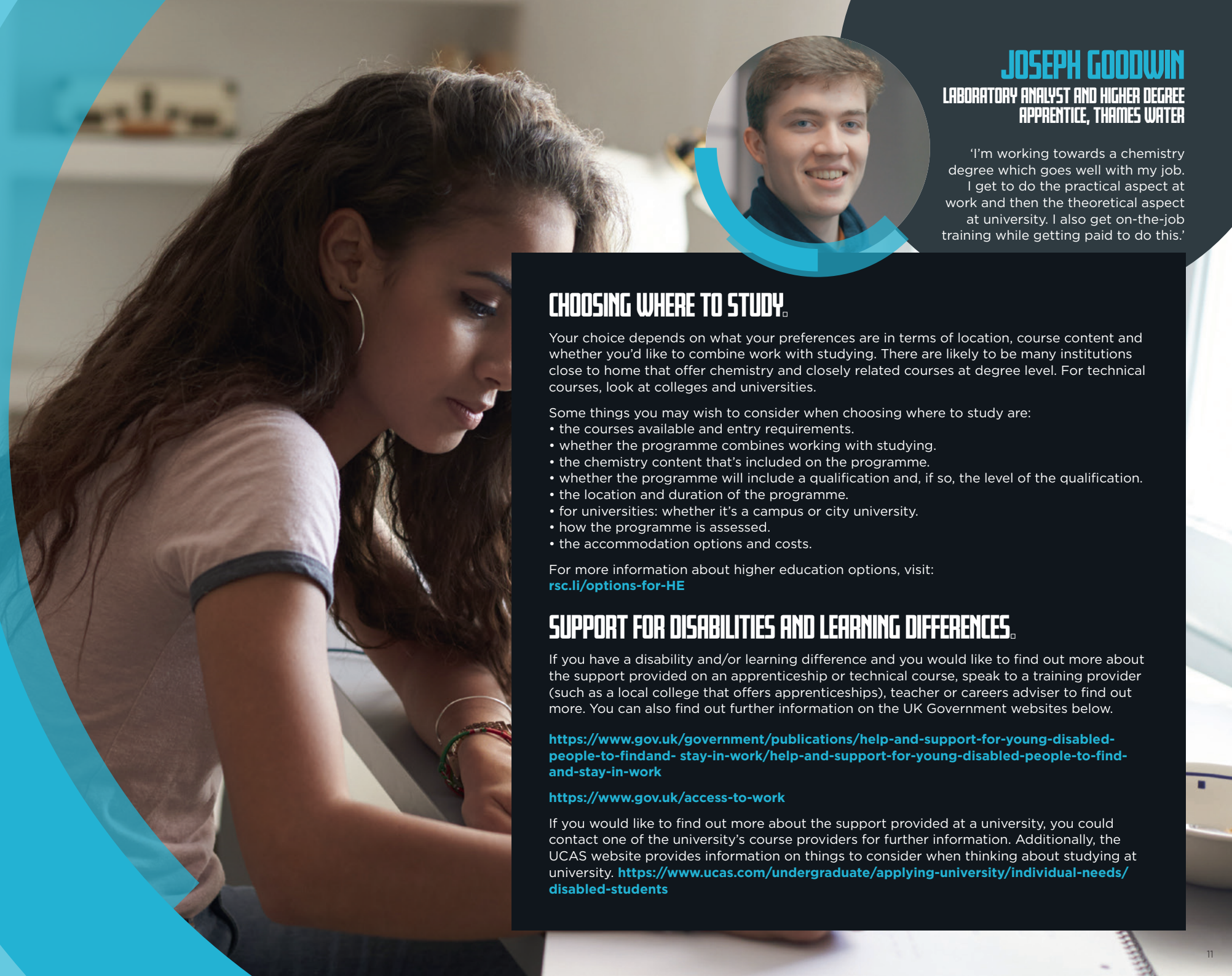
SUPPORT FOR DISABILITIES AND LEARNING DIFFERENCES

If you have a disability and/or learning difference and you would like to find out more about the support provided on an apprenticeship or technical course, speak to a training provider (such as a local college that offers apprenticeships), teacher or careers adviser to find out more. You can also find out further information on the UK Government websites below.

<https://www.gov.uk/government/publications/help-and-support-for-young-disabled-people-to-find-and-stay-in-work/help-and-support-for-young-disabled-people-to-find-and-stay-in-work>

<https://www.gov.uk/access-to-work>

If you would like to find out more about the support provided at a university, you could contact one of the university's course providers for further information. Additionally, the UCAS website provides information on things to consider when thinking about studying at university. <https://www.ucas.com/undergraduate/applying-university/individual-needs/disabled-students>



WHERE YOUR HIGHER EDUCATION OPTIONS COULD LEAD.

HIGHER EDUCATION

Level		Academic qualifications		Applied or technical qualifications		Apprenticeships	Into the workplace
Eng, Wal, NI	Scot	Offered by universities		Offered by a range of providers including universities and colleges. These are generally available up to level 5 (or 8 in Scotland).		A job that involves 20% formal learning through a college, university or other provider. In some apprenticeships you will also gain a formal qualification; check with the provider for details.	
3	6	Eg A-levels, Scottish Highers, International Baccalaureate From these qualifications you can generally enter any higher education options, though entry to some providers can depend on your grades.		Eg Applied Science BTEC or other applied general qualification, Science T-level, Laboratory skills SVQ From these qualifications you can generally enter applied or technical higher education options and apprenticeships. You may also be able to enter some academic degrees directly. Your exact options are likely to depend on your grades.		Advanced or Foundation apprenticeship These may incorporate a qualification such as an applied science BTEC.	With qualifications at this level you can enter roles such as laboratory technician. You may be able to gain more qualifications while you are working.
4	7	CertHE (exit from degree)	Integrated master's degree		HNC		With qualifications at these levels you can enter applied and technical roles such as chemical technician and technician scientists, as well as more specialised roles.
5	8	DipHE (exit from degree)		Foundation degree	HND		
6	9/10	Bachelor's/Honours degree		It is often possible to progress to a bachelor's degree or degree apprenticeship.		Degree apprenticeship These may incorporate a BSc.	With qualifications at these levels you can enter technical and applied roles as well as more research-focused and other graduate or postgraduate level roles.
7	11	Master's degree		Master's-level apprenticeship			
8	12	PhD					

TECHNICAL OR APPLIED HIGHER EDUCATION QUALIFICATIONS

Applied or technical qualifications are designed with the help of employers, meaning you'll develop the skills and knowledge that employers look for. These qualifications are at education levels 4/5 (7/8 in Scotland). With qualifications at these levels, you can enter applied and technical roles such as chemical technician and technician scientist, as well as more specialised roles. Also, it is often possible to progress to a bachelor's degree or degree apprenticeship after taking one of these qualifications (they are not a full alternative to a bachelor's degree). To compare the different qualification levels, refer to the higher education options summary on page 13.

Entry requirements vary for applied or technical courses and they can be more accessible than full degrees. These qualifications can be studied full time in college or university, or part time – giving more flexibility. Many people who study these types of qualifications are already working or are doing the qualification as part of an apprenticeship.

THE MAIN APPLIED OR TECHNICAL HIGHER EDUCATION QUALIFICATIONS ARE

Higher National Certificates (HNCs) and Higher National Diplomas (HNDs)

These are work-related qualifications that are designed alongside industry partners to ensure students gain the skills and knowledge employers seek. Chemistry-related courses include analytical science, applied science and chemical science for industry. These qualifications are usually offered by colleges or other training providers. An HNC is level 4 (level 7 in Scotland) and will take one year to complete if studied full time. An HND is a level 5 qualification (level 8 in Scotland) and will take two years to complete if studied full time. From these qualifications, it is possible to enter applied and technical roles and it is often possible to progress to a bachelor's degree or degree apprenticeship.

Foundation degrees

Foundation degrees are work-based qualifications that are offered by universities and other higher educational establishments in areas such as applied chemistry, analytical chemistry, forensic science and pharmaceutical science. They are level 5 qualifications (level 8 in Scotland) that take two years to complete if studied full time (some can be studied part time). Foundation degrees are sometimes available through an apprenticeship (page 16 of this booklet). From a foundation degree, it is possible to enter applied and technical roles and it is often possible to progress to a bachelor's degree or degree apprenticeship.

For more information visit *A future in chemistry*.
rsc.li/options-for-HE



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), foundation apprenticeship (Scotland) and level 3 apprenticeships (Northern Ireland). In Scotland, the equivalent level 3 programme is called a foundation apprenticeship, at level 6 Scottish credit and qualification framework (SCQF). 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). After doing a level 3 apprenticeship, you could continue to higher education at level 4 or to a higher or degree apprenticeship. These apprenticeships can lead to 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.



ERIN MACIEJEWSKI
PROCESS CHEMIST, GLAXOSMITHKLINE

'I was initially drawn to chemistry by the practical aspect and hands-on learning approach I was able to take within the classroom. This is what influenced me to undertake an apprenticeship instead of a more traditional academic route since it would enable me to gain much more practical experience.'

'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.'

WHERE TO FIND AN APPRENTICESHIP

To help you choose the right apprenticeship, it's important that you consider getting work experience. If you are thinking of undertaking an apprenticeship or technical route, our *A future in chemistry* website includes information about work experience options and where to apply for an apprenticeship. [rsc.li/search-apply](https://www.rsc.li/search-apply)

Things to bear in mind about apprenticeships:

- What are the entry requirements?
- Where is the apprenticeship based? Will you need to travel?
- Does the apprenticeship have a formally recognised qualification?
- Will you be able to balance your time between working and studying?

BACHELOR'S AND INTEGRATED MASTER'S DEGREES

Bachelor's and integrated master's chemistry degrees offer in-depth training in theoretical and practical chemistry, often allowing you to specialise in a particular field of chemistry.

There are a number of chemistry and related science courses available, but before you decide to study any subject, you should find out what the course will involve. Course content and length will vary at each university and you need to make sure you pick the right fit for you.

- Bachelor's degrees are level 6 qualifications (level 9/10 in Scotland) that take three years to complete. In Scotland, undergraduate degrees can be four years long and can be referred to as 'masters' but these are not a postgraduate master's degree. With a qualification at this level, you can enter technical and applied roles as well as more research-focused and other graduate level roles.
- Integrated master's degrees take four years to complete and include a three-year bachelor's degree qualification, with one year's master's-level content, leading to a level 7 qualification at the end (level 11 in Scotland). In Scotland, a postgraduate master's degree can be five years long. With a qualification at this level, you can enter technical and applied roles as well as more research-focused and other graduate and postgraduate level roles.

HOW TO CHOOSE A COURSE

Read different university websites for course information, engage with university open days or virtual visits, contact admissions tutors or speak to someone already doing a similar course. You can also ask a teacher or careers adviser. This will help you make a decision about which courses to apply for.

The entry requirements for a bachelor's or integrated master's degree vary between universities and some courses are more competitive than others, requiring higher grades. The UCAS website [ucas.com](https://www.ucas.com) has a comprehensive database of courses available and their entry requirements.

USEFUL WEBSITES

What do graduates do?
<https://luminate.prospects.ac.uk/what-dograduates-do>

A future in chemistry
rsc.li/career-jobs

For help choosing a degree, visit our website or UCAS:
rsc.li/going-university
<https://www.ucas.com/>

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, check which courses are accredited by the Royal Society of Chemistry. By choosing an accredited degree, you can be confident you're getting a high quality education that will provide you with the right skills for future employment.

rsc.li/accredited-courses

CELINE MOREIRA, MRSC ANALYTICAL TECHNICIAN, POLYMATERIA

'I chose to study chemistry because it's a very complex subject and it's a subject that always makes you think and it challenges you and I love a challenge.'



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