

Biochemist

Introduction

Biochemists study the chemistry of life. They investigate life's processes at the level of molecules, using their knowledge to identify and solve biological problems. They research and develop new products and processes to benefit a wide range of areas, including food processing, pharmaceuticals, health care and agriculture.



Work Activities

Biochemistry involves studying the basic life processes, for example, the way that DNA is transferred between cells and can be manipulated to solve problems. Biochemists work with all types of organisms, from micro-organisms to plants and animals.

Biochemical techniques are very important to nearly all areas of biological research, so biochemists work in all areas of modern biology.

Industry

As an Industrial Biochemist, you will develop new products and monitor the production process, ensuring safety and quality. You'll work in a very wide range of industries, including food, pharmaceutical, brewing, biotechnology and agrochemical companies.

For example, Biochemists in biotechnology companies have developed genetic techniques and applied them to making vital proteins and hormones such as insulin, a chemical which is lacking in people with diabetes.

You could help to produce vaccines and antibodies, and investigate the way in which DNA can be manipulated to provide remedies for genetic disorders. It was Biochemists who developed the use of DNA fingerprinting in forensic science.

At the start of pharmaceutical research projects, you will usually investigate how a disease develops and spreads. The results help to decide the biological properties and chemical structure that a drug should have.

As a Biochemist, you could also be involved in helping to decide which form a drug should take as a medicine, for example, as a tablet, injection or lotion.

Working on a new drug involves routine testing, first on cells in a test tube or culture dish ('in vitro' testing) and then on animals and human volunteers ('in vivo').

Medicine

As a Clinical Biochemist, you will usually work in hospitals, analysing body tissues and fluids to help with the diagnosis of disease.

Disease causes change in the complex biochemistry of the body, so Biochemists can detect disease by analysing the concentration of substances in body fluids and tissues. For example, glucose levels increase in patients who have diabetes mellitus, and urea increases when people have kidney disease.

A typical general hospital will perform over a million tests a year, so you will use highly sophisticated automated testing machines to test up to a thousand samples an hour (for example, of sodium, glucose and urea in the blood).

In contrast, identifying an unknown drug taken in an overdose may take days of more intricate, manual testing, using a range of technology and laboratory techniques.

You could also be involved in researching and developing new analytical techniques, often working with colleagues in industry or universities.

Agriculture

As an Agricultural Biochemist, you will be involved in agricultural research and the agrochemical industry help to develop products such as pesticides and fertilisers.

You'll use your knowledge of genetic modification to develop pest-resistant crops, improve crop yields and increase the amount of time that foods will keep for.

You might monitor the environment, for example, tracing pollutants as they move through food chains.

Computing and bioinformatics

A number of Biochemists are involved in bioinformatics. This is the application of information technology (such as the internet and databases) to biology.

For example, there are internet databases containing the sequence of the whole genome of different bacteria. You would use this information to analyse how similar one bacterium is to another.

Other specialist areas

Biochemists can also work in many other areas, including education, medical writing, journalism, marketing and sales.

Being able to read, write and speak Welsh may be an advantage when you're looking for work in Wales.

Personal Qualities and Skills

To become a Biochemist, you'll need:

- to be curious, and have an enquiring mind
- the ability to think logically
- a thorough, patient and methodical approach to your work
- good organisational skills to plan and carry out experiments
- practical laboratory skills
- observation skills, accuracy and attention to detail
- maths, statistics and computer skills
- the ability to explain results clearly and concisely, including in written reports
- teamwork skills

The process of ensuring that a chemical product is safe may involve tests on animals, so you need to be prepared to be involved in this.

Pay and Opportunities

Pay

The pay rates given below are approximate. NHS employees are paid on a rising scale from the Agenda for Change.

- Starting: Band 6 pay of £28,050 - £36,644
- With experience: Band 7 pay of £33,222 - £43,041
- Senior Biochemists earn Band 9 pay of £84,507 - £102,506

Hours of work

Biochemists typically work 35-39 hours a week, Monday to Friday. However, they might need to have early starts, late finishes, shifts and weekend work.

Where could I work?

Major employers throughout the UK are companies in the brewing, food and drink and pharmaceutical industries.

Other opportunities are with universities, the Biotechnology and Biological Sciences Research Council, the Medical Research Council, the Natural Environment Research Council, the Department for Environment, Food and Rural Affairs (Defra) and the NHS.

Opportunities for biochemists occur in towns and cities throughout the UK.

Where are vacancies advertised?

Vacancies are advertised in local/national newspapers, on recruitment and employers' websites, and on Find a Job (www.gov.uk/jobsearch).

Social media websites, such as LinkedIn, Twitter or Facebook, are a great way to network, find vacancies and get in contact with possible employers. Make sure that your profile presents you in a professional manner that will appeal to potential employers.

Take a look at our General Information Article 'Finding Work Online'.

GreenJobs is a job board aimed at people interested in green careers:

www.greenjobs.co.uk/browse-jobs/biology-jobs

Entry Routes and Training

Entry routes

It's usual for Biochemists to have a degree in biochemistry or a closely-related subject with a substantial biochemical content. It's important to check college/university websites very carefully to check how much biochemistry is involved.

Single subject degrees in biochemistry are widely available. Universities often also combine biochemistry with subjects such as chemistry, genetics and biotechnology. Degrees in medical biochemistry are also available.

A number of sandwich degrees in biochemistry are available.

Some universities offer courses with a foundation year. This is an extra year for students who don't have the specified science A levels for entry.

A small number of universities offer integrated science degrees (ISciences), aiming to give graduates interdisciplinary skills and knowledge through a problem-based approach.

Because biochemistry is a research-based discipline, many graduates go on to take a postgraduate qualification, such as a specialist MSc, or undertake research towards a MPhil or PhD.

Postgraduate qualifications are often essential for entry into research positions in higher education and research institutions.

It might be possible to work your way up from the position of Laboratory Technician. You would usually need to study part-time while employed as a Technician to do this, for example, by day-release. Entrants with relevant science HNDs or foundation degrees usually begin in technician-level posts.

To join the NHS Scientist Training Programme (STP) as a Clinical Biochemist, you'll need at least a 2.1 in a relevant BSc (Hons) degree. For example, this could be in biochemistry, chemistry or another subject with substantial biochemistry content. A relevant postgraduate degree and/or research experience is desirable. (Recruitment for the STP open in January of each year).

Training

Some employers give graduates the opportunity to work towards a postgraduate qualification while they are in employment.

Trainee clinical biochemists in the NHS Scientist Training Programme (STP) have three years of approved and accredited workplace training. The first year takes place in a range of settings, with specialisation in the last two years. You will also work towards a relevant MSc.

A great way to get into this career is through an internship. Take a look at our information article 'Internships', for more details.

Work Experience

Previous experience working in a laboratory during industrial work placements would be really useful for this career.

Progression

You could progress into a supervisory or management-level post. Postgraduate qualifications can be very important for career progression.

Clinical biochemists follow a structured career path, eventually leading to a consultant post, for example, as the head of a large hospital department.

Qualifications

To enter a degree course in biochemistry, the usual minimum requirement is:

- 2/3 A levels where chemistry is usually essential, with at least one other science subject or maths. Some universities also make biology essential. Others ask for chemistry or biology.
- GCSEs at grade C/4 and above in your A level subjects
- a further 2/3 GCSEs at grade C/4 and above. Either English or maths (or both) can be specified

Alternatives to A levels include:

- BTEC level 3 qualifications
- the International Baccalaureate Diploma

However, course requirements vary, so please check college/university websites very carefully.

Some universities accept the Welsh Baccalaureate as equivalent to 1 A level.

Adult Opportunities

Age limits

It is illegal for any organisation to set age limits for entry to employment, education or training, unless they can show there is a real need to have these limits.

Skills/experience

Some entrants have developed laboratory skills during industrial work placements.

Courses

If you don't have the qualifications needed to enter a degree, foundation degree or HND course, you might be able to start one after completing an Access course, for example, Access to Science. You don't usually need any qualifications to enter an Access course, although you should check this with the course provider.

A foundation year before the start of a science degree or HND is available at some universities and higher education colleges for students who don't have the science A levels usually needed for entry to the course.

Funding

Funding for postgraduate study and research is available, through universities, from the Biotechnology and Biological Sciences Research Council (BBSRC), Natural Environment Research Council (NERC) and the Medical Research Council (MRC).

Further Information

Contacts

- **GreenJobs**
Email: info@greenjobs.co.uk
Website: www.greenjobs.co.uk
- **New Scientist**
Publisher: Reed Business Information Ltd
Email: ns.subs@quadrantsubs.com
Website: www.newscientist.com
- **Queen's University Belfast**
Irish enquiries
Website: www.qub.ac.uk
- **Association for Clinical Biochemistry and Laboratory Medicine (ACB)**
Tel: 020 7403 8001
Website: www.acb.org.uk
- **Association of the British Pharmaceutical Industry (ABPI)**
Address: 7th floor, Southside, 105 Victoria Street, London SW1E 6QT
Tel: 0870 8904333
Website: careers.abpi.org.uk
- **Biochemical Society**
Address: Charles Darwin House, 12 Roger Street, London WC1N 2JU
Tel: 020 7685 2400
Email: genadmin@biochemistry.org
Website: www.biochemistry.org
- **Biotechnology and Biological Sciences Research Council (BBSRC)**
Address: Polaris House, North Star Avenue, Swindon SN2 1UH
Tel: 01793 413200
Email: webmaster@bbsrc.ac.uk
Website: www.bbsrc.ac.uk
- **Natural Environment Research Council (NERC)**
Address: Polaris House, North Star Avenue, Swindon SN2 1EU
Tel: 01793 411500
Website: www.nerc.ac.uk
- **Medical Research Council (MRC)**
Address: 14th Floor, One Kemble Street, London WC2B 4AN
Tel: 01793 416200
Email: corporate@headoffice.mrc.ac.uk
Website: www.mrc.ac.uk
- **Earthworks-jobs.com**
Website: www.earthworks-jobs.com
- **Association of the British Pharmaceutical Industry (ABPI) Scotland**
Scottish enquiries
Address: Crichton House, 4 Crichton's Close, Edinburgh EH8 8DT
Tel: 0131 5230493
Website: careers.abpi.org.uk
- **Genetics Society**
Address: c/o Portland Customer Services, Commerce Way, Colchester CO2 8HP

Tel: 01206 796351
Email: theteam@genetics.org.uk
Website: www.genetics.org.uk

- **Department for Environment, Food & Rural Affairs (Defra)**
Address: Nobel House, 17 Smith Square, London SW1P 3JR
Tel: 0845 9335577
Email: defra.helpline@defra.gsi.gov.uk
Website: www.gov.uk/government/organisations/department-for-environment-food-rural-affairs
- **People Exchange Cymru (PEC)**
Public sector recruitment portal for Wales
Email: peopleexchangeymru@gov.wales
Website: www.peopleexchangeymru.org.uk/home

Related Careers

- Materials Scientist
- Biomedical Scientist
- Astronomer
- Biotechnologist
- Botanist
- Analytical Scientist
- Analytical Chemist
- Colour Technologist
- Ecologist
- Forensic Scientist
- Biology Laboratory Technician
- Chemistry Laboratory Technician
- Physics Laboratory Technician
- Marine Biologist
- Microbiologist
- Acoustician
- Zoological Scientist
- Toxicologist
- Clinical Research Associate
- Process Development Technologist
- Soil Scientist
- Laboratory Technician
- Scientist
- Biologist
- Physicist