ANALYTICAL JOBS FOR ANALYTICAL MINDS

Finding out the requirements and needs of the industry in the current market will place the budding analytical chemist ahead of the pack.

The development and application of methods, instruments and strategies to obtain information on the composition and nature of matter in space and time, otherwise known as analytical chemistry, is traditionally a field that is in great demand in industry. Every chemical endeavour requires some sort of measurement to help answer a question, and analytical chemists are experts at making valid measurements. Companies that require analytical chemists include not just pharmaceutical firms (who are the biggest hirers of analytical chemists, requiring experts in mass spectrometry (MS) and separations instrumentation), but also biomedical start-up companies (for example, biomedical analysis and instrumentation), the basic chemical industry, the energy industry (for example, petroleum and battery developers), electronics (for example, R&D in molecular diodes and LEDs) and also instrument manufacturers.

Given the range of tasks that an analytical chemist can carry out in the pharmaceutical industry, having a solid, broad background in chemistry is highly desirable, in addition to the obligatory good communications skills and the ability to solve problems. In the United States, finding the right graduate school is relatively easy given the availability of the *US News* annual rankings of graduate chemistry programmes (BOX 1). Attending a school with a strong and diverse programme in analytical chemistry is important, says James Jorgenson, Professor of Chemistry at University of North Carolina, Chapel Hill, whose analytical chemistry programme topped the *US News* list for 2002. "It broadens the experience of the student, as well as providing a peer group of students doing research in a variety of fields."

The smart analytical-chemist-to-be should also find out the needs of the pharmaceutical industry and the current market to develop a desirable skill-set, says Daniel Sem, former Vice President of Triad Therapeutics who returned to academia as Assistant Professor of Chemistry at Marquette University, Milwaukee, in part to address deficiencies he saw in the academic education of the areas of chemistry needed by industry. "In economically hard times [such as now], companies will be focusing more on later-stage molecules in clinical trials, and the analytical chemist will help generate data using assays they have developed as part of clinical endpoints," he says. During these times, expertise in high-performance liquid chromatography and MS is essential, expertise in nuclear magnetic resonance spectroscopy is needed (especially earlier on in the discovery process), and becoming familiar with Good Laboratory Practice and Good Manufacturing Practice regulations would be helpful. "But what is truly rare and always valuable is someone with experience in pharmacokinetics — that is, being able to deal with animal and human tissue samples as well as modelling of *in vivo* kinetic data, and being comfortable running and maintaining key analytical instrumentation," says Sem.

Once the economy recovers, companies will focus more on early-stage R&D, and knowledge of medicinal chemistry and biochemistry or pharmacology will be helpful. Another area in which analytical chemistry features prominently in early-stage R&D is combinatorial chemistry (see Finding the right chemistry. *Nature Rev. Drug Discov.* **2**, 163 (2003), and the review by Geysen on page 222 of this issue), as the quality of compounds created in a library is as crucial as the number and diversity of compounds. "Dealing with quality-control data on this scale means an analytical chemist needs training in dealing with automation, databases and indeed the whole field of chemoinformatics," says Sem.

So, analytical chemists can increase their marketability by learning medicinal chemistry and biochemistry, and by gaining exposure to pharmacokinetics and chemoinformatics, for example, through an industrial post-doc position or internship. There are many resources available to help you understand the issues and requirements for a career in analytical chemistry (BOX 1), and by applying yourself to the task in an analytical manner, a successful analytical chemistry career should beckon.

Simon Frantz

Box 1 | **Careers resources**

Many of the general chemistry careers resources have been previously listed (see Finding the right chemistry. *Nature Rev. Drug Discov.* 2, 163 (2003).

American Chemical Society (ACS): .....http://www.chemistry.org/
The largest scientific society in the world, with over 150,000 members.

Royal Society of Chemistry (RSC): .....http://www.rsc.org/
The professional body for chemical scientists in the United Kingdom with around 50,000 members worldwide. Its joblistings appear on the Chemsoc website (http://www.chemsoc.org/) and NatureJobs (http://naturejobs.nature.com/js.php?&q= chemistry).

spectroscopyNOW.com: .....http://www.spectroscopynow.com
A spectroscopy portal created by the publishers John Wiley & Sons, which contains news, features and a recruitment centre providing information on training and worldwide careers in this field.

usnews.com — best graduate schools: .....http://www.usnews.com/usnews/edu/grad/rankings/rankindex.htm
Annual rankings of the best US graduate programmes, which are produced by asking deans, programme directors and senior faculty to rate the academic quality of programmes in their field.

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