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## Environmental Chemist

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**Earnings (Yearly Average):** \$63,920 (Bureau of Labor Statistics, 2011)

**Employment Outlook:** Average growth (Bureau of Labor Statistics, 2010)

**O\*NET-SOC Code:** 19-2031.00

**Related Career Clusters:** Agriculture, Food, & Natural Resources; Architecture & Construction; Government & Public Administration; Health Science

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### Scope of Work

Environmental chemists study the various chemicals found in nature and the effects of human-introduced chemicals on the environment. This may involve gathering and studying samples, establishing remediation programs, providing guidance and management during emergency response efforts, and helping companies comply with federal regulations. Although environmental chemists initially focused on determining which chemicals and reactions might be harming particular ecosystems, later advancements in technology made it possible for chemists to analyze not only the chemicals but also the environmental damage itself. For instance, after an oil spill, an environmental scientist might analyze the damage, determine that a certain type of dispersant is essential to the cleanup effort, and recommend a course of action. Environmental chemists examine the origin, transfer, and ramifications of chemicals driven into the environment, determine solutions, and work to restore the environment and preserve it from further destruction.

### Education and Coursework

The interdisciplinary nature of environmental chemistry requires training in a broad range of areas, and those pursuing a career in the field must undertake coursework in a number of disciplines. An aspiring

### Transferable Skills

- Communication Skills – Speaking effectively (SCANS Basic Skill)
- Interpersonal/Social Skills – Working as a member of a team (SCANS Workplace Competency – Interpersonal)
- Research & Planning Skills – Identifying problems
- Research & Planning Skills – Determining alternatives
- Organization & Management Skills – Organizing information or materials
- Technical Skills – Using technology to process information (SCANS Workplace Competency – Information)
- Technical Skills – Performing scientific, mathematical, and technical work
- Work Environment Skills – Working both indoors and outdoors

environmental chemist should take advanced placement courses in chemistry in high school, along with any additional courses in environmental studies that may be available. At the undergraduate level, a student of environmental chemistry should develop a solid foundation in several sciences, including biology, ecology, mineralogy, and engineering. Courses that build strong interpersonal and communication skills are recommended as well, as chemists must communicate scientific information to a diverse set of individuals and audiences through oral briefings, written documents, training sessions, and public hearings.

Though an associate's or bachelor's degree may prove adequate for some, many experienced professionals recommend that aspiring environmental chemists obtain a master's degree from a program approved by the American Chemical Society. Environmental chemists interested in teaching at the university level or obtaining certain research positions should pursue a doctorate in the discipline. Though doctoral programs typically emphasize research, they differ significantly in subject matter and methodology. For instance, in the doctoral program at the Nicholas School of the Environment and Earth

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Sciences at Duke University, doctoral students choose from subjects including marine science and conservation, earth and ocean sciences, and environmental studies and policy. Students at the Yale School of Forestry and Environmental Studies have options ranging from hydrology to tropical ecology and water resource management.

### **Career Enhancement and Training**

Many environmental chemists begin as research assistants, field analysts, or technicians and work their way toward increased responsibility and autonomy as project leaders. Others pursue degrees in public policy, law, or business. For instance, an individual might use his or her knowledge of chemical processes to serve in a corporation's regulatory affairs department, ensuring that government standards are upheld.

A career in environmental resource management is a natural fit for individuals with specialized environmental science degrees looking to take on more responsibility and perhaps effect more positive change. An environmental manager oversees large-scale operations to improve areas that have been damaged in some way by people or industry. They plan and supervise projects, manage researchers and technicians, and measure progress during the effort. Other environmental chemists move up to positions in research or academia, joining the faculty at a college or university or becoming full-time researchers.

### **Daily Tasks and Technology**

Environmental chemists fill a number of roles. Those working for state and local governments may help to write and enforce regulations to protect citizens and the environment. They may perform inspections and scrutinize complaints regarding air quality, water quality, and food safety. Scientists working for private consulting firms may oversee projects to ensure that they adhere to environmental standards and comply with regulations.

Regardless of the industry, environmental chemists typically determine collection methods for research projects, collect environmental data, analyze that data, and prepare reports to explain the findings. After assessing threats to the environment, they may develop remediation programs to prevent, manage, or repair the problems. For

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instance, an individual may construct a plan to restore a contaminated body of water. Work is primarily performed in a laboratory, except when a situation requires the study of chemicals in the environment. Some companies use indoor ecosystems to conduct experiments and test their products.

### **Earnings and Employment Outlook**

The employment of environmental scientists and related specialists, including environmental chemists, is projected to experience average growth between 2010 and 2020, increasing by 19 percent. According to the US Bureau of Labor Statistics, average wages for such scientists vary widely, in part because the designation “environmental scientist” encompasses a wide range of workers with different specialties, job titles, and responsibilities. Wages also vary greatly based on industry of employment.

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Changing technology and increased government environmental intervention have led to greater opportunities for environmental chemists. In 2012, the *New York Times* reported that the Environmental Protection Agency (EPA) was beginning to undertake several of the most expensive and technically complex cleanups in the history of the organization, intending to transform massive stretches of polluted urban waterways in Oregon, Washington, Massachusetts, Connecticut, New York, and New Jersey. Such initiatives provide ample opportunities for environmental chemists, who may use their skills to analyze the nature and severity of the pollution in the water and surrounding land, determine how best to remove the pollution, and report their findings to the EPA and other government organizations. As more time and money are put into such cleanup projects, new technology will be

### **A Conversation with Ann L. Franke**

*Job Title: Product Analyst, Information Services industry*

#### **What was your career path?**

After majoring in chemistry I went on for a Master of Science in public management and policy. I have worked as a health policy analyst in government and as a research analyst and chemist in consulting firms in the environmental area. My experience working with hazardous chemical data led to my current position as a product analyst at EBSCO Publishing. My role includes identifying hazardous chemicals cited in documents contained in the databases of Expert Publishing, a product that provides decision-support chemical information for the environmental health & safety community. I also process the documents for inclusion in the indexed databases.

#### **What are three pieces of advice you would offer someone interested in your profession?**

A background in science or engineering is a good basis for a variety of professions, including information services. Although I have not worked as a chemist in a laboratory setting, I have found that the technical nature of the chemistry degree was useful both for getting into graduate school and for finding jobs requiring analytical skills. Computer skills also are essential for participating in electronic publishing. Keeping up with current events and breakthroughs in health and science is also important.

#### **What paths for career advancement are available to you?**

Possible opportunities for advancement include taking on more responsibilities for the maintenance, expansion, and marketing of the product and training and supervising new staff as the product grows.

needed to analyze and eliminate pollutants more efficiently, providing further opportunities for environmental chemists working in the research and development sector of the field.

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## Related Occupations

- **Environmental Engineers:** Environmental engineers work to solve environmental problems by designing and supervising the creation of environmentally friendly structures and systems.
- **Hydrologists:** Hydrologists work to reduce water pollution, develop methods of water conservation and preservation, and oversee the construction of hydroelectric power plants and waste treatment facilities.
- **Geoscientists:** Geoscientists study the earth's physical composition, construct detailed geological maps, and work to locate natural resource deposits.
- **Environmental Science and Protection Technicians:** Environmental science and protection technicians investigate the causes of pollution, often working alongside environmental chemists.
- **Materials Scientists:** Materials scientists examine substances to identify their chemical and physical makeup and apply this information to the production of new materials.

## Future Applications

While interest and advances in environmental chemistry have been somewhat slow to develop, the effects of the field on academia and industry are now widespread. Many universities throughout the world have programs that emphasize environmental chemistry, producing graduates with high expectations about what can and should be accomplished with regard to sustainable products and practices. This, along with increasing knowledge of the hazards created by chemical waste and ever-expanding technological advances, has prompted increased corporate interest in environmental chemistry and a push toward developing environmentally friendly processes and technologies in a variety of industries. To do so, such industries will continue to require the skills of environmental chemists, who may work in a number of areas.

Consulting firms will need to hire chemists to help clients interpret increasingly complex environmental laws and regulations and ensure

that necessary changes are made. Other environmental chemists will be needed to assist with the planning and construction of new utilities to ensure that they meet new standards. In the manufacturing and technology industries, chemists will be needed to design cost-effective methods for meeting environmental regulations, while others will work to reduce inefficiencies and develop new products. Regardless of specialty or industry of employment, environmental chemists will play a crucial role in moving technology forward and raising further awareness of the effects of human actions on the natural world.

*Molly Hagan*

### **More Information**

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