Hazardous Waste Management Chemists

... Find solutions to problems

Hazardous waste is any solid, liquid, or gaseous waste material that may pose substantial hazards to human health and the environment if improperly treated, stored, transported, disposed of, or otherwise managed. Every industrial country has had problems with managing hazardous wastes. Improper waste management has necessitated expensive cleanup operations in many instances. Efforts are under way internationally to remedy past problems caused by hazardous waste and to prevent future problems through source reduction (eliminating hazardous wastes at the source), recycling, treatment, and proper disposal of hazardous wastes.

... Have a range of employment opportunities

Chemists in this field enjoy a wide range of careers. They are an integral part of teams of scientists responsible for identifying the presence of chemical pollutants in the air, water, and soil. Chemists also help design techniques that reduce pollution and remediate (clean up) problems caused by hazardous waste. Opportunities also include positions as chemical engineers and environmental engineers focused on waste management.

Hazardous waste management is a fairly new field that dates back to the 1970s. As it evolved, many companies realized they would need to use rigorous scientific investigation to solve their environmental problems. As various government agencies began to issue and enforce waste management regulations, these organizations sought chemists who could provide the scientific knowledge necessary to comply with the law. Opportunities for chemists have been growing ever since.

Chemists in hazardous waste management work for a variety of organizations including academia, government, and chemical companies. There are also companies specifically formed to provide hazardous waste management services, often in a focused area. For example, zero-discharge hazardous waste companies take in sludges—mainly from industrial manufacturing processes—which they clean or convert into new products, leaving nothing that must be sent to a landfill.

Chemists in this field must know the government's rules and regulations for handling and disposing of hazardous materials and be familiar with the hazardous materials themselves. They must also understand biology and be able to work with biologists to determine the toxicological and potential carcinogenic effects of a hazardous material.

... Work in a service-oriented industry

Because hazardous waste management is a service-oriented industry, careers often feature a rapid pace and irregular hours. For instance, some companies specialize in remediating sites contaminated with hazardous waste, which is commonly caused by accidental discharge. Since spills and emergencies do not always happen during the workday, remediation specialists may be on call 24 hours a day for clients who need immediate help.

... Have the potential for advancement

In this field, chemists generally start out testing and analyzing materials. A typical entry-level hazardous waste management chemist tests or takes samples in the field at a remediation site or works for one of the many contract analytical labs across the country that specialize in analyzing hazardous materials.

Entry-level positions generally require only a bachelor's degree in chemistry, and people typically stay with an entry-level job one to two years before advancing, either within the company or to another firm. On-the-job experience is considered the best training. Advanced degrees are far less important in hazardous waste management than in the more structured academic world; only 10% of chemists working in this field hold doctorates.

In many cases, managers in hazardous waste management come from a chemical engineering background rather than a pure chemistry background. Chemists with a bachelor's degree, however, may eventually manage large analytical labs or become responsible for developing remediation programs and overseeing the people who perform the cleanup work. Whether a chemist in this field remains in the lab or moves into a management-track position depends more on temperament and personal career goals than training.

This fast-paced line of work is challenging, profitable, and dynamic. Career-oriented chemists who seek opportunities for advancement in an organization enjoy a good job outlook.

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Originally produced with funding from the Alfred P. Sloan Foundation as part of its Science Career Cornerstone Series.

FACT FILE: Hazardous Waste Management Chemists

WORK DESCRIPTION ► Hazardous waste management chemists generally use analytical chemistry skills to determine the composition of materials deemed hazardous, working either in a lab or in the field. Teamwork is a key element. Biologists, toxicologists, and water and soil chemists work together to evaluate hazardous wastes and develop strategies for disposal or cleanup.

WORKING CONDITIONS ► Most chemists in hazardous waste management are bench chemists who do instrumental analysis of materials in a lab. They also model chemical fate and evaluate bioavailability and remedial success. Environmental engineers may divide their time between office work and meetings and conducting environmental sampling. In academic environments, chemists research and develop products that clean up hazardous wastes. Improvements in equipment used in the field have minimized the routine work chemists have had to do in the past, allowing them to do more trace analytical work.

PLACES OF EMPLOYMENT ► Employers run the gamut from academia to government and from chemical companies to firms that specialize in cleaning up hazardous waste. Independent analytical labs are excellent places to learn about the instrumentation and methods used in the field. In the past they attracted only entry-level chemists, but they now offer good opportunities for today's more career-oriented chemists to advance.

PERSONAL CHARACTERISTICS ► Hazardous waste chemists need an interest in the environment, an aptitude for detail, and the flexibility to keep up with constantly changing government regulations. The ability to work in teams is vital. Good communication skills are necessary to move into management or business-oriented positions.

EDUCATION AND TRAINING ► A bachelor's or master's degree in chemistry is required to enter the field of hazardous waste management. Few Ph.D. chemists are hired, since their education is often deemed too narrow or focused for the broad base of skills needed in hazardous waste management. A strong foundation in analytical, organic, and inorganic chemistry is recommended. Knowledge of geology and areas of environmental chemistry—such as soil or water chemistry, and the chemistry involved in biodegradation—make candidates for employment more attractive to potential employers. Other beneficial skills for chemists in this field are math ability and computer training.

JOB OUTLOOK ► Hazardous waste management chemists enjoy a good job outlook today. The growing number of U.S. Environmental Protection Agency (EPA) regulations has created plentiful opportunities. Although chemists can find hazardous waste management companies nationwide, some areas of the country have more jobs available. These include the South and Texas, with their concentration of petrochemical makers. Western states, such as Utah, are becoming centers for hazardous waste disposal and offer good employment opportunities.

SALARY RANGE ► The starting salary for a chemist with a bachelor's degree is in the mid to high $30,000-per-year range; master's degree holders can expect to start in the $40,000-per-year range; and Ph.D. holders, when hired, earn salaries in the upper $70,000-per-year range.

FOR MORE INFORMATION

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WHAT YOU CAN DO NOW ► To find out whether you would enjoy working in this field, consider a summer internship, often available at hazardous waste and chemical companies. The field can also be explored by taking courses in the environmental sciences and the basic chemical sciences used in hazardous waste management.