
Chemical Engineers

(0*NET 17-2041.00)

Nature of the Work

Chemical engineers build a bridge between science and manufacturing, applying the principles of chemistry and engineering to solve problems involving the production or use of chemicals. They design equipment and develop processes for large-scale chemical manufacturing, plan and test methods of manufacturing products and treating byproducts, and supervise production. Chemical engineers also work in a variety of manufacturing industries other than chemical manufacturing, such as those producing electronics, photographic equipment, clothing, and pulp and paper. They also work in the healthcare, biotechnology, and business services industries.

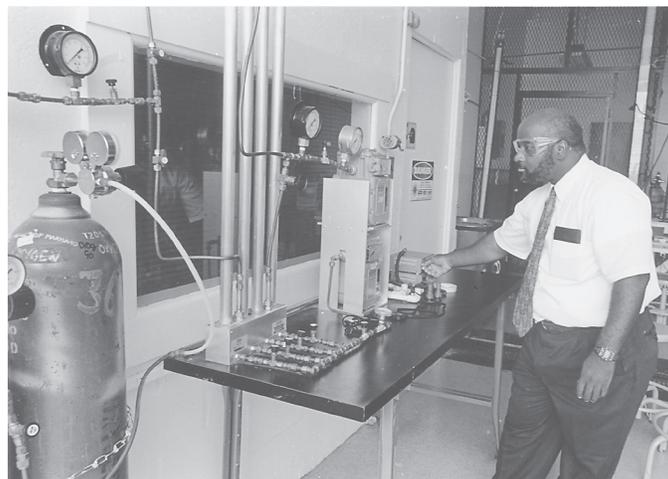
The knowledge and duties of chemical engineers overlap many fields. Chemical engineers apply principles of chemistry, physics, mathematics, and mechanical and electrical engineering. (See chemists and materials scientists; physicists and astronomers; mechanical engineers; electrical and electronics engineers, except computer; and mathematicians elsewhere in the *Handbook*.) They frequently specialize in a particular chemical process such as oxidation or polymerization. Others specialize in a particular field, such as materials science, or the development of specific products such as fertilizers and pesticides, automotive plastics, or chlorine bleach. They must be aware of all aspects of chemicals manufacturing and how it affects the environment, the safety of workers, and customers. Because chemical engineers use computer technology to optimize all phases of research and production, they need to understand how to apply computer skills to chemical process analysis, automated control systems, and statistical quality control.

Employment

Chemical engineers held about 33,000 jobs in 2002. Manufacturing industries employed 55 percent of all chemical engineers, primarily in the chemicals, electronics, petroleum refining, paper, and related industries. Most others worked for professional, scientific, or technical services firms that design chemical plants or perform research and development or other services, mainly for chemical companies.

Job Outlook

Little or no growth in employment of chemical engineers is expected through 2012. Although overall employment in the chemical manufacturing industry is expected to decline, chemical companies will continue to research and develop new chemicals and more efficient processes to increase output of existing chemicals. Among manufacturing industries, pharmaceuticals may provide the best opportunities for jobseekers. Many of the jobs for chemical engineers, however, will be in nonmanufacturing industries, especially services industries such as research and testing services. Even though no new jobs due to growth are expected to be created, many openings will result from the need to replace chemical engineers who transfer to other occupations or leave the labor force.



In addition to working in the chemical industry, chemical engineers are employed in a variety of other manufacturing industries and professional, scientific, and technical services firms.

Earnings

Median annual earnings of chemical engineers were \$72,490 in 2002. The middle 50 percent earned between \$58,320 and \$88,830. The lowest 10 percent earned less than \$48,450, and the highest 10 percent earned more than \$107,520.

According to a 2003 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates in chemical engineering received starting offers averaging \$52,384 a year, master's degree candidates averaged \$57,857, and Ph.D. candidates averaged \$70,729.

Sources of Additional Information

Information on careers, employment, education, training, conferences, and publications on chemical engineering is available from:

► American Institute of Chemical Engineers, 3 Park Ave., New York, NY 10016-5901. Internet: <http://www.aiche.org>

Additional information on careers in chemical engineering is available from:

► American Chemical Society, Department of Career Services, 1155 16th St. NW., Washington, DC 20036. Internet: <http://www.chemistry.org/portal/Chemistry>

See the introduction to the section on engineers for information on working conditions, training requirements, and other sources of additional information.