Chemistry
Makes The
Chemical Engineer

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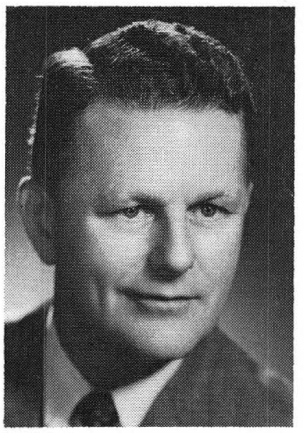

The chemical engineer is characterized by his versatility—his ability to apply a varied training to problems as they relate to research, development, works engineering, manufacturing and sales. The recognition and solution of these problems require that the engineer have, among other qualities, a knowledge, understanding, and an ability to communicate his thoughts on the relationship that exists between the chemical and engineering aspects of a problem.

The practicing chemical engineer relies heavily on organic and physical chemistry—to a much lesser degree on qualitative and quantitative analysis—in his varied technical activities.

There are many ways in which a chemical engineer can be characterized, but among his many attributes his versatility is outstanding.

This is as it should be because the problems and opportunities which confront the practicing chemical engineer demand that the individual be adaptable and reach out to almost any discipline in his search for the best solution to a problem.

In evaluation of the chemical engineer in industry, judgments have been passed on the kinds of technical training and proficiency that are required to contribute effectively. Opinions have been expressed that sales and manufacturing require an individual with certain technical training, strengths and interests in contrast to that required for research and development. In practice the individuals who are concerned with problems in all the areas must have sound technical training to achieve above-average performance. The basic difference between the jobs can be related to how the technical training is applied, personal interests and qualities of the individual.

Chemistry plays a basic role in the development of the engineer. It is vital to the solution of problems in all areas with which chemical engineers are concerned. The difference occurs in how basic chemistry is used or applied to the solution of problems.

The chemical engineer who is concerned with *R & D* activities must have a good *knowledge of chemistry* and he must be able to *use* that knowledge to solve research problems. These may be related to process analysis, the planning of experiments, design of laboratory apparatus, interpretation of results, development of basic data, design of pilot plant equipment, etc. The knowledge and ability to use chemistry is basic to the effective solution of chemical engineering problems in a research or in a development assignment.

The chemical engineer who is concerned with the *design* of process equipment or is responsible for plant design must have an *understanding* of all phases of chemistry and he must have the ability to interpret this understanding in his design.

The research engineer is generally concerned with the study of reaction systems. The basic data that are developed completely describe and qualify the features that must be recognized to satisfy the process. The design engineer must extend his understanding of the chemistry to interpret the basic data in the form of a workable reactor.

The Chemical Engineer who is concerned with the design of process equipment or is responsible for plant design must have an understanding of all phases of chemistry and he must have the ability to interpret this understanding in his design.

The design engineer is frequently committed to take a greater responsibility for separation and auxiliary equipment. Without a knowledge and understanding of chemistry and physical chemistry the design engineer will not be in a position to evaluate the basic data and the requirements and limitations that the chemistry may impose on the design of the equipment and plant.

The chemical engineer who is concerned with *manufacturing* must have an *understanding* of chemistry and he must be able to apply that understanding to analyze problems to achieve effective control of his operation. The modern manufacturing supervisor is much more than an administrator. He must have an ability to apply an understanding of chemistry to control his operation, diagnose difficulties, and recognize the opportunities for technical improvements. He must be able to intelligently and clearly present a problem proposal to a chemist and have sufficient knowledge to interpret a recommendation for a correction or an improvement.

The chemical engineer who is concerned with *sales* must have a good *understanding* of chemistry to *communicate* information about the chemical properties of his company's product. He must be able to understand and communicate the customers' technical problems and needs to his company's technical center. The sales engineer today is much more than a peddler or an individual who takes orders. He may be a trained, experienced chemical engineer who knows his product and is sensitive to his customer's problems and needs.

His technical strength is such that in many cases he can solve chemical and engineering problems for the customer on the spot, and he can participate in an intelligent discussion of technical needs to present an analysis for his company that identifies product deficiencies and requirements. In many cases he may suggest either an approach, a program, or possibly a solution to the problem.

In order to understand how a chemical engineer uses his knowledge of chemistry to enhance his professional development we should examine the manner in which he gains experience in industry.

The new graduate possesses a strong technical appetite and he demands that his first assignment take maximum advantage of his training in the engineering discipline. In general then, the new hire is assigned to a research and development activity. As the individual gains experience he identifies interests and personal qualities which, when superimposed on his basic technical strengths, can provide him with a higher degree of personal and professional achievement than he can realize as a career engineer. He then may pursue a career in administration or continue his professional development in sales, manufacturing, research, development, etc. It is well to emphasize again that the extension of his career is based on his reinforced technical training, personal qualities and interests; but underlying all of these directions into which his career may extend is the basic need for a working and communicating knowledge of chemistry.

In the discussions which we have held with individuals who are actively engaged in the areas that have just been discussed, it was generally agreed that the following needs for chemistry exist:

General—a thorough knowledge of chemical reaction principles and mechanisms, particularly in organic chemistry.

Chemistry—A knowledge of chemistry (organic and inorganic) is vital to a chemical engineer to ensure his ability to solve problems, to design facilities and to communicate with his colleagues, the chemists and the customer.

Physical Chemistry—for the engineer perhaps the most important branch of chemistry. When combined with the derivatives of mechanics, i.e., mass and energy transport, it can serve

as a foundation for the solution of most problems that may concern a chemical engineer.

Qualitative and Quantitative Chemistry—Benefit may be derived from the manipulative skills which are developed. It is felt that this training can be achieved in a shorter time and the information should be presented in a survey course.

Chemical engineers should be exposed to some aspects of analytical chemistry and should be familiar with instrumental methods that can be used for raw material, process streams, and product analysis.

The modern chemical engineer must have a practical knowledge of all phases of chemistry, regardless of his field of interest. The curriculum should place greater emphasis on organic and physical chemistry and less stress on qualitative and quantitative analysis.

Mr. Thaddeus W. Tomkowit is general superintendent of the Process Department at the Chambers Works of the duPont Company, Deepwater, N.J. He received the Ch E degree in Chemical Engineering from Columbia University in 1942 and has experience in research, development, engineering, and manufacturing with the duPont Company. He is past national chairman of AIChE Student Chapters Committee and presently is a national director of AIChE.

ChE news

Readers and others are invited to submit news items and technical announcements of professional interest for publication here. Consideration must be given to the fact that CEE publishes quarterly.

STILLWATER, Okla.—The second annual educational conference on process design will be held on the campus of Oklahoma State University here March 4 and 5. The lectures at this conference will be on the design of process reactors.

Sponsored by the School of Chemical Engineering, the two-day meet will feature lecturers with academic and industrial backgrounds, according to Prof. Wayne C. Edmister, conference director.

In addition to general considerations in reactor design and analysis, subjects to be covered include gas-liquid and gas-solid non-catalytic reactors, mathematical modeling of reaction rate data and chemical reactors, reactor and regenerator analysis and design, and control and optimization applications.

Lecturers for the conference are Prof. J. J. Carberry, Department of Chemical Engineering, University of Notre Dame, Notre Dame, Ind.; Dr. J. R. Kittrell, Chevron Research Corp., Richmond, Calif.; and Dr. V. W. Weekman, Jr., Mobil Research and Development Corp., Paulsboro, New Jersey.

Information regarding technical content of the conference is available from Prof. W. C. Edmister. Housing and registration forms are available from Dr. Monroe W. Kriegel, director, Engineering and Industrial Extension, Oklahoma State University, Stillwater, Okla. 74074.