CHEMICAL ENGINEERING AS A PROFESSION

Origin and Early Growth of the American Institute of Chemical Engineers

By JOHN C. OLSEN,

Secretary, 1908–1927; President, 1931

WHEN one endeavors to trace the origin of any human institution or society, the path almost invariably leads back to some outstanding personality whose mind first conceived the need and purpose of the organization and whose initiative and industry were responsible for its early growth and development. In the case of the American Institute of Chemical Engineers, the personality was that of the late Richard K. Meade, a brilliant engineer and the pioneering editor and founder of *The Chemical Engineer.*

That brave little publication had just rounded out the first year of its existence when, in October, 1905, its editorial pages propounded the question: "Why not the American Society of Chemical Engineers?" The mining, civil, electrical and mechanical engineers had already been organized and each had a strong national society in this country. So Mr. Meade's question was indeed pertinent.

"The Profession is now a recognized one," he said, "and there are probably at least five hundred chemical engineers in this country. . . . Schools of chemical engineering have been established at most of our leading universities and technical institutions—notably Columbia, the University of Michigan, the University of Pennsylvania and the University of Wisconsin. . . . There is no need for the chemist to work secretly any more than there is for the civil, mining and electrical engineers. These men meet and exchange ideas to mutual advantage. Why should not chemical engineers find profit in a like exchange?

"The chemical engineer is not a chemist who understands mechanical engineering, nor a mechanical engineer who understands chemistry. He is primarily a chemist, a theoretical as well as a practical chemist, who knows how to carry out on a large scale the reactions worked out in the laboratory. A society formed of such men could not fail to be of benefit, not only to its individual members,

but also to the profession at large and to manufacturers the country over. Its membership need not be large, but it should be representative of the profession. . . . Quality and not quantity should be the motto of the new society."

But it took time for the seeds of this particular idea to take root and grow. Constant cultivation was necessary, and Meade kept at it unceasingly during the next two years. In March, 1907, he reprinted his original editorial and pursued the matter farther with personal letters to fifty or more leading chemists and chemical engineers of his acquaintance. He found willing support in a growing sentiment that there was a real need for the organization of a chemical engineering society with high ethical and professional requirements for its membership. Accordingly, Meade took the responsibility of issuing a call for a preliminary meeting to be held in Atlantic City during the 1907 session of the American Society for Testing Materials.

Before reviewing the significant events of that meeting and the series that followed it, a further word about the personality and background of the man who made this first great contribution to the founding of the Institute will no doubt be of interest. Educated as a chemist at the University of Virginia and later at Lafayette College, Richard K. Meade early selected the cement industry as his field for specialization. He acquired expert knowledge of this branch of chemical engineering by working as a chemist in a number of mills, and at the same time studying all of the engineering features of the processes involved. After ten years of this experience, he established a consulting office and entered upon his life work in the design, construction and operation of cement plants. He later broadened his field to include the manufacture of quicklime, utilizing the rotary kiln, which had been so successfully used in the cement industry. Meade's personality was of the finest type. He was modest and unassuming and his work exemplified the highest ethical standards of the profession. At the time he advocated the formation of a society of chemical engineers, he undoubtedly fulfilled all of the requirements for active membership which subsequently were to be written into the constitution of the Institute. His premature death in 1930 was a real loss to the profession.

That Richard K. Meade had confidence in the future of the chemical engineering profession was shown by his founding in November, 1904, of the monthly journal called *The Chemical Engineer* because, to quote from his introductory editorial, "the vast majority of the

SAMUEL P. SADTLER
(1847–1923)
President 1908–09

CHARLES F. MCKENNA
(1861–1930)
President 1910

F. W. FRERICHS
(1849–)
President 1911

L. H. BAEKELAND
(1863–)
President 1912

technical chemists of the present day are not only workers of the laboratory, but have the active supervision of the operation of great chemical and metallurgical industries, and hence are, strictly speaking, engineers who direct an enterprise. Upon them depends the success of the process." Associated with him as contributing editors were such early leaders of the profession as William H. Walker, William Miller Booth, Samuel P. Sadtler and Thorn Smith. These men, with perhaps a dozen others, answered Meade's call for the meeting in Atlantic City on June 21, 1907.

The group was fortunate in having for its chairman Dr. Charles F. McKenna of New York, a seasoned chemical engineer who had long been a leader in technical and professional activities. His broad knowledge and experience was an asset of incalculable value in this formative period of the Institute's history. Under his direction the discussion at the first meeting centered around the need for an organization that could maintain the highest standards in the chemical profession. Even at that early date emphasis was placed on the necessity for improving chemical engineering education. Legislation was sorely needed for the betterment of patent procedure. These and other worthwhile activities were set forth as reasons for organizing the chemical engineers of the country.

As might be expected, that ubiquitous question, "What is a chemical engineer?" bobbed up incessantly at these early meetings. William Miller Booth, who served as secretary of the Atlantic City meeting and who had been keenly interested in Mr. Meade's proposal since its first announcement in 1905, offered the following definition: "Chemists or mechanical engineers who design and construct plants of a nature requiring a thorough fundamental knowledge of applied chemistry may be termed chemical engineers." Others at the Atlantic City meeting, in addition to those I have already mentioned, included Professor H. P. Talbot, H. E. Diller, E. C. Holton, J. E. Stone, Andrew Robertson, Arthur D. Little and the writer. It seemed to be the consensus of the meeting that while it might be highly desirable to form a new society, there nevertheless existed considerable doubt as to whether a sufficient number of members could be found to make the organization successful. It was obvious, therefore, that nothing should be rashly undertaken without first ascertaining the sentiment of the profession.

Finally, it was decided that a committee of five should be appointed to consider (*a*) the advisability of organizing a society of chemical engineers; (*b*) to formulate conditions of membership; and

(*c*) to correspond with men likely to be interested. When the committee was appointed, the chairman of the meeting, Dr. McKenna, was added to its personnel and made its chairman. The other members were Richard K. Meade, William M. Booth, J. C. Olsen, William H. Walker and Arthur D. Little. The meeting then adjourned, leaving the fate of the proposed society in the hands of this committee of six. But this confidence was not misplaced, for despite minor disputes and defections from its ranks, this group became the organizing committee of the American Institute of Chemical Engineers.

The committee started its work promptly. The first meeting was held in New York, on July 8, 1907, with McKenna, Booth and Olsen present. To secure the information on which to base its ultimate decision, the following letter was drafted and subsequently mailed out on September 3 to a list of 600 men in the chemical profession of the United States and Canada:

New York, Sept. 3, 1907.

Dear Sir—

At Atlantic City, June 21, 1907, a number of chemists, mostly members of the American Society for Testing Materials, met and discussed the advisability of forming a society to be composed of trained chemists who are designing, constructing, managing or controlling establishments involving the application of chemical principles to the treatment of raw materials or doing work having an intimate connection with such operations; such a society to have a high standard of admission somewhat similar to the requirements of membership for the American Society of Civil Engineers. (Ten years of practical experience, five of which being in a responsible position. Age limit for Junior Members 20 years, for Senior Members 30 years.)

The general opinion of those present at this meeting was that the formation of such a society would tend to raise the standing of chemists among manufacturers and that many other advantages would accrue, among which the following were mentioned by various speakers:

a. Raising the standard of education of chemists.
b. Raising the ethical standard of the profession.
c. Encouraging bold and original work by members.

Quarterly national meetings were suggested to avoid the evils of localized control.

Some doubt was expressed as to whether the time had come for the formation of such a society because of possible detriment to the present very excellent chemical societies, and also as to whether there is a general desire among chemists for its organization.

A committee was appointed to present the matter to a large number of American chemists and obtain their opinion as to the advisability of the formation at this time and the conditions of membership of such a society.

This committee, therefore, addresses you and asks for your opinion with reference to the following:

1. Do you consider the formation of such a society advisable?

T. B. WAGNER
(1867–)
President 1913

M. C. WHITAKER
(1870–)
President 1914

GEO. D. ROSENGARTEN
(1869–)
President 1915–16

G. W. THOMPSON
(1865–)
President 1917–18

2. In your opinion is an organization on such lines likely to afford any special and important advantages?

3. Do you believe these advantages would continue in the future?

4. Would you favor the use of the title—American Society of Chemical Engineers?

5. Would you favor a high standard of admission?

6. Would you favor an age limit for membership, 30 for instance?

7. Would you favor Junior and Senior grades of membership?

8. Would you favor a membership test by education, career or achievement, any or all of these?

The committee will appreciate an early reply and a full statement of your views on the questions asked and any other pertinent suggestions which you may wish to offer.

CHARLES F. MCKENNA, *Chairman*,
221 Pearl St., New York, N. Y.
WILLIAM M. BOOTH, *Secretary*,
Syracuse, N. Y.
JOHN C. OLSEN,
Polytechnic Institute, Brooklyn, N. Y.
RICHARD K. MEADE,
Nazareth, Pa.
WILLIAM H. WALKER,
Institute of Technology, Boston, Mass.
ARTHUR D. LITTLE,
93 Broad St., Boston, Mass.

When the committee of six met on October 19 at the Hotel Belmont in New York to canvass the replies to the September 3 letter, it was struck by the considerable difference of opinion among the leaders of the chemical profession despite the overwhelming proportion in favor of the project. About 200 replies were received, and of these 70 or 80 per cent were favorable to the formation of the new society. It was felt by a number of prominent chemists that the support should be given to the existing societies rather than to a new one. The views subsequently submitted by the good Dr. Charles F. Chandler may be cited as typical of this group:

"I really feel very sorry that my brother chemists should propose the creation of an additional chemical society. It would really seem as though we had enough already, and I would beg my friends to think the subject over very carefully before they create a new society. Of course, if such a society is created, I should be sorry to be left out, but there are a great many chemists in this country who cannot afford to join many societies, and it is a pity to deprive them of the privilege of associating with their fellow chemists, especially for the reason that so many are so meagerly paid that the question of dollars-and-cents plays so important a part in their lives."

The American Chemical Society was well established and active and much of the opposition came from its officers and from teachers

of theoretical chemistry. "The former," wrote Mr. Meade in *The Chemical Engineer,* "could, of course, be lightly turned aside as coming from sources inimical to any new society, and the latter as coming from parties unacquainted with the conditions which made this particular new society desirable." The criticisms most often heard of the older society were that it did not (*a*) meet the needs of men in industrial work, and (*b*) it did not select or grade its membership on the basis of professional ability or attainment. To this extent it was argued that the American Chemical Society did not render the service to the profession which the chemical engineers required. There seemed to be a growing sentiment that the only way in which the latter could obtain proper professional standing was to organize a society of chemical engineers carefully selected for their professional attainments and high ethical standards.

True to its conservative policies, the committee, after carefully considering all of the replies, decided that it would be well to hold a larger and open meeting at which those opposed to the new society, as well as those in favor of it, could advance their arguments and opinions. Accordingly, at a meeting held on December 9, 1907, with McKenna, Meade, Olsen and Walker present, it was decided to select a committee of fifty men prominent in the chemical profession, care being taken that men who opposed the organization of the new society were included as well as those known to favor it. The following men were, therefore, invited to attend a meeting at the Hotel Belmont, to be held on January 18, 1908.

Committee of Fifty

E. G. Acheson
C. E. Acker
Jerome Alexander
Peter T. Austen
A. Bement
M. T. Bogert
W. H. Bassett
T. L. Briggs
J. M. Camp
Chas. F. Chandler
W. M. Chauvenet
Alan A. Claflin
M. H. Clark
W. W. Daggett
C. B. Dudley
J. W. Ellms
Herman Frasch
Wm. M. Grosvenor
Edward Gudeman
Albert P. Hallock
N. F. Harriman
Edward Hart
R. C. Hoffman
W. D. Horne
Henry Howard
L. S. Hughes
A. C. Humphreys
W. R. Ingalls
H. W. Jordan
H. E. Kiefer
Karl Langenbeck
A. C. Langmuir
Waldemar Lee
N. W. Lord
A. Lundteigen
Wm. P. Mason
Wm. McMurtrie
J. D. Pennock
Andrew Robertson
Rudolph de Roode
S. P. Sadtler
F. Schniewind
Thorn Smith
F. G. Stantial
T. B. Stillman
Maximilian Toch
M. C. Whitaker
J. Edward Whitfield
W. R. Whitney
F. G. Wiechmann

ARTHUR D. LITTLE
(1863–)
President 1919

DAVID WESSON
(1861–)
President 1920–21

HENRY HOWARD
(1868–)
President 1922–23

CHARLES L. REESE
(1862–)
President 1924–25

Twenty-one men attended the meeting, and fourteen expressed their views in the form of letters. A stenographic report of the intensely interesting discussion which occurred at that meeting is still available, and may be read with profit by any student of the very human history of the beginning of the Institute. The opponents of the plan occupied fully as much of the meeting's time as did its advocates. Through all the discussions ran the sane, considerate and conservative viewpoint of the chairman, Dr. McKenna. In less expert hands the meeting might well have broken up in disorder, but instead it proved a helpful and stimulating symposium despite differences of opinion and definition.

One of the objections raised (by Alan A. Claflin and F. G. Stantial of Boston) was that since a great deal of the work of the chemical engineer must, of necessity, be kept secret, it would be almost impossible to obtain good chemical engineering papers for publication and discussion. Also, they thought it would be difficult to obtain sufficient information about the work of candidates in order to pass intelligently upon their qualifications for membership. Experience proved that the first of these objectives had some validity, for the literature of chemical engineering, as such, grew rather slowly for many years. On the other hand, it has always been possible, without disclosing confidential information, to obtain sufficient data about the character of the chemical engineering work of any candidate in order to pass on his qualifications for membership.

Another objection strenuously urged was that there were already a sufficient number and variety of chemical societies to take care of all of the legitimate needs of the profession. Some felt that the work of the American Chemical Society would be seriously weakened by the new organization. That this objection has proved entirely invalid is evidenced by the fact that during the past twenty-five years the American Chemical Society has had a tremendous growth—increasing from 3,079 in 1906 to 18,963 at the close of 1931. It is even possible that the organization of the American Institute of Chemical Engineers contributed considerably to this growth, for it helped to attract many mechanical engineers and industrialists into the chemical profession.

As is frequently the case in free-for-all discussions, many of the arguments put forth at the Hotel Belmont meeting were invalid because of a lack of understanding or a difference of opinion as to the exact nature of the subject discussed. In this instance the conception of what constitutes a chemical engineer was vague and con-

fused in the minds of some of the opponents of the proposed organization. The results of the work of the American Institute of Chemical Engineers during the past twenty-five years have been to differentiate the professional work of the chemical engineer and greatly clarify the public conception of the term. But as one looks back to 1908, it is encouraging to find that even at that time the founders of the Institute had a remarkably clear and correct conception of the proper functions of the chemical engineer. For example, Dr. H. August Hunicke of St. Louis, who subsequently became one of the first vice-presidents of the Institute, made the following statement to Dr. McKenna in 1907:

"If we define chemical engineering as the art of intelligently applying the forces and materials of nature to the needs of man, we will at once see the bearing of chemistry on the engineering arts . . . which give us the scientific principles to create that branch of engineering which has for its object the transformation of matter. . . . The day has come when chemical engineering has grown to be something distinct, a province of engineering differing from all others in that it aims at solving problems involving principles entirely foreign to the other engineering professions."

But despite the favorable trend of the discussion, the meeting at the Hotel Belmont adjourned without reaching a definite decision on the problem at hand. In a final attempt to ascertain the sentiment of the meeting, Dr. F. G. Wiechmann had proposed the resolution: "Resolved, that it is deemed the opinion of the present committee that an Institute of Chemical Engineers be formed." But this was never voted on by the meeting, for it was decided upon subsequent motion by Walter Renton Ingalls to submit Dr. Wiechmann's proposal to a mail vote of the committee of fifty, after a complete stenographic report of the evening's discussion had been printed and sent to all members of the committee. This report contained, as well, the membership requirements that had been developed by the committee of six and subsequently were incorporated, with only minor changes, into the first constitution of the Institute. In the meantime the committee had also concluded from the discussion and correspondence that the large proportion of the group favored the following propositions:

1. The proposed organization should be called the American Institute of Chemical Engineers.

2. The Institute should not attempt the publication of a journal but should confine its publications to a volume or volumes of Transactions.

3. None of the existing journals should be designated as the official organ of the society, but members should be free to publish articles wherever they chose.

Thirty-six replies were received from the larger committee and of these twenty-two were in the affirmative, six were negative and eight were neutral, although three of the latter stated they would join if the organization were formed. A letter from Thorn Smith, who at that time was a chemist for the Ducktown Sulphur, Coal & Iron Co., at Isabella, Tenn., was most emphatically in favor of the organization. Another from Mr. A. Bement in Chicago was also favorable. Samuel P. Sadtler of Philadelphia said that he was against multiplying of chemical societies, but if the majority of the conference voted to organize the proposed society of chemical engineers, he would join in the movement. Dr. Charles B. Dudley, chemist for the Pennsylvania Railroad at Altoona, Pa., was inclined to follow Dr. McKenna's lead. Dr. Willis R. Whitney, in characteristic outspoken fashion, said:

"I am of the opinion that good could well come from the proposed new society and I consider that over 100 replies favoring its formation are sufficient warrant for the undertaking. I am confident that among these men there are some who could well carry the load of directing so that the society could make good, and this, too, without seriously subtracting from the good now done by our other chemical societies of whatever adjective. It is an experiment in which you risk a little only of time. You stand a chance of winning much and cannot possibly lose anything."

Mr. A. Lundteigen, then of Union City, Mich., wrote that he was convinced that the new society would benefit not only the members but the nation as well. J. W. Ellms, writing from the water works at Cincinnati, Ohio, appeared to be favorable, as did Professor V. W. Ford of Ohio State University. Others who indorsed the movement were Andrew Robertson of Richmond, Va., and Professor L. A. Olney of Lowell, Mass. A fine letter from Dr. Arthur D. Little stated that after having read the various communications which Mr. Booth, as secretary, had forwarded to him, he was greatly pleased to note the large proportion of first-rate men who declared themselves in favor of the proposed society. He said, further,

"It seemed to me that the nature of these responses clearly indicates a general and strong desire for the organization of the society and, as this has been the only point in question in my mind, you may count me as heartily in favor of the proposition and ready at any time to do my utmost to make it a success."

Dr. Little followed with a number of helpful suggestions for the new organization. Dr. Maximilian Toch also strongly indorsed the idea and pointed out that there is room for new enterprises at any time provided they are constructive.

With sentiment so overwhelmingly in favor of the project, the committee of six now felt that it was at last warranted to proceed with the actual formation of the new society, and it therefore called a meeting to be held for this express purpose in Philadelphia on June 22, 1908. In the meantime the committee proceeded to draft a constitution to be presented at this organization meeting. The secretaries of the existing engineering societies were interviewed for advice and the constitutions of their organizations were carefully studied. The committee was especially impressed by the very evident success which had been achieved by the American Society of Civil Engineers in setting up and maintaining high standards for its membership. As a result of these studies, many helpful and valuable features were incorporated into the draft of the constitution for the new society.

Invitations to attend the organization meeting had been sent to a selected list of 100 chemical engineers which had been carefully prepared from previous lists and the correspondence which had accumulated. Care was taken to select only such men as the committee had reason to believe would qualify as members of the proposed society.

Enthusiasm ran high among the forty men who met in the Engineers' Club in Philadelphia on that hot June day in 1908. Dr. McKenna, again serving as temporary chairman, introduced Dr. Samuel P. Sadtler, who welcomed the society on behalf of the important chemical engineering industries of the Philadelphia district, which in that day were explosives, textiles, petroleum refining, linoleum, morocco, ammonia and glycerin. Dr. McKenna responded with a stirring address entitled "The Justification of the American Institute of Chemical Engineers." It is one of the first great contributions to the professional literature of chemical engineering in the United States, and as such it holds a prominent place in Volume I of our *Transactions*.

Following Dr. McKenna's address, a committee consisting of Ingalls, Meade and Alexander was appointed to study the credentials of the men in attendance, and subsequently this committee reported that all present were entitled to vote as chemical engineers. As a matter of fact, it was decided that the charter members of the Insti-

HUGH K. MOORE
(1872–)
President 1926

E. R. WEIDLEIN
(1887–)
President 1927–28

ALFRED H. WHITE
(1873–)
President 1929–30

JOHN V. N. DORR
(1872–)
President 1932

tute should comprise those in attendance at the Philadelphia meeting and those who were elected officers or appointed members of the membership committee. All of these men had originally been selected by the committee of six and had expressed interest in and sympathy with the aims of the founders of the Institute. The number of charter members totaled forty. The list follows:

American Institute of Chemical Engineers Charter Members

ACHESON, EDWARD G.
ADAMSON, GEORGE P.
ALEXANDER, JEROME
ALLEN, LUCIUS E.
BARTON, G. E.
BASSETT, WILLIAM H.
BEMENT, A.
BOOTH, WILLIAM M.
BROWN, H. F.
CAMP, J. M.
CATLIN, CHARLES A.
DANNERTH, FREDERICK
DOW, ALLAN W.
FRERICHS, F. W.
GROSVENOR, WM. M.
GUDEMAN, EDWARD
HAANEL, EUGENE
HEATH, GEORGE M.
HOLLICK, HERBERT
HORN, DAVID WILBUR
HUNICKE, HENRY AUGUST
INGALLS, WATER RENTON
KAUFMANN, H. M.
LANGMUIR, ARTHUR C.
MASON, WM. P.
MCKENNA, CHARLES F.
MEADE, RICHARD K.
MILLER, A. L.
OLNEY, LOUIS A.
OLSEN, JOHN C.
REESE, CHARLES LEE
RENAUD, HENRY STANLEY
REUTER, LUDWIG
ROBERTSON, ANDREW
SADTLER, SAMUEL P.
SMITH, THORN
TRAUTWEIN, A. P.
WESSON, DAVID
WHITFIELD, J. EDWARD
WIECHMANN, FERDINAND G.

Messrs. Olsen, Grosvenor, Renaud, Sadtler and Whitfield were appointed a committee on constitution. Their report was presented at an afternoon session and after the new constitution was read, section by section, some minor changes were made, and it was finally adopted.

Messrs. Wiechmann, Adamson, Dannerth, Whitfield and Trautwein, who had been appointed a committee on nominations, reported in favor of the election of the following officers:

President—SAMUEL P. SADTLER
First Vice-President—CHARLES F. MCKENNA
Second Vice-President—H. AUGUST HUNICKE
Third Vice-President—EDWARD G. ACHESON
Secretary—JOHN C. OLSEN
Treasurer—WM. M. BOOTH
Auditor—RICHARD K. MEADE