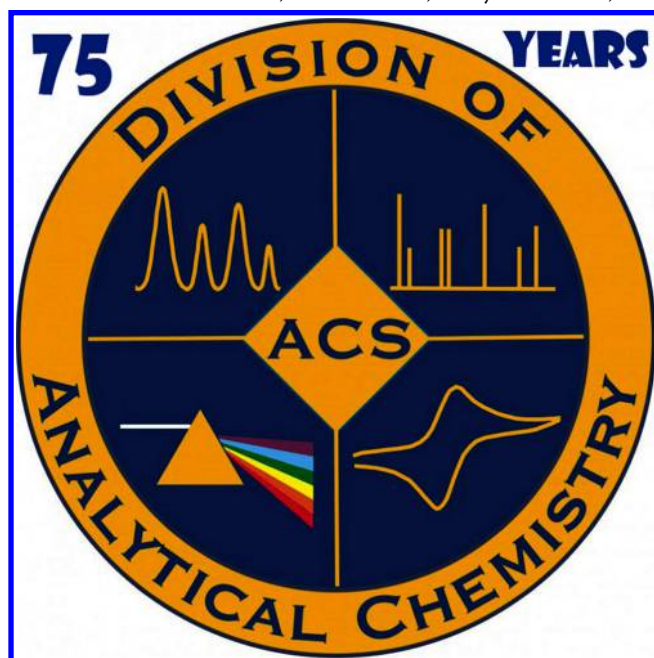


## 75 Years of the Division of Analytical Chemistry of the American Chemical Society

The Division of Analytical Chemistry is celebrating the 75th anniversary of its founding in 1938. We celebrate the continuing high importance of our discipline for all aspects of chemical science and for its applications in so many aspects of everyday life. We especially celebrate the accomplishments of our fellow analytical chemists through the years, and the impact we have had on the profession. This article is a short history of the Division within the context of the parallel development of our profession and our science.

Roland F. Hirsch\* Councilor, Division of Analytical Chemistry

20458 Waters Point Lane, Germantown, Maryland 20874, United States



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Division of Analytical Chemistry.

This history of the Division builds on the writings of several of our members over the years, particularly for the 10th and 50th anniversaries. References are provided for these writings and for specific information in the text from other sources.

### ■ ANALYTICAL CHEMISTS AND THE EARLY YEARS OF THE ACS<sup>1</sup>

Analytical chemists have been an influential element in the American Chemical Society from its beginning in 1876. Many of the early Presidents of the ACS were active in the field, including the first three: John W. Draper (1876), J. Lawrence Smith (1877) and Samuel W. Johnson (1878).

The 1890s were a critical decade for the ACS, and analytical chemists were largely responsible for first, the survival, and then, the growth of the society. The ACS had been established in New York and was largely made up of chemists living in the

area surrounding the city. Because of this geographical limitation the ACS membership fell from its initial 192 to 167 in 1889, despite the increasing national number of chemists in academic, commercial, and government institutions. In 1889 analytical chemists Frank Clarke, Harvey W. Wiley, and Charles Monroe initiated plans for a national chemical society, which developed into a formal call for a "Federation or Association of American Chemists" in August 1891. The new federation came into being in 1892, taking the name American Chemical Society and incorporating the existing "ACS" as the New York Section of the new organization. Harvey Wiley was elected at the end of 1892 as the first President of the new ACS (he was reelected for 1894). As an example of the prominence of analytical chemistry in the ACS during this decade, Charles B. Dudley (President, 1896 and 1897) gave these two presidential addresses: "Some present possibilities in the analysis of iron and steel" and "The dignity of analytical work".

Another significant development in this period was the initiation by analytical chemist Edward Hart in 1887 of the *Journal of Analytical Chemistry*. The journal was quite successful, and in 1893 Hart was invited to take over publication of the *Journal of the American Chemical Society*, which was doing poorly. Hart merged the two under the JACS name and created the policies that made it a permanent success.

Analytical chemists continued to be a major influence on the ACS in the early years of the 20th century. The discipline was important to industry and essential for many government agencies. William F. Hillebrand of the U.S. Bureau of Standards was heavily involved in the ACS during this period. He was concerned that industrial chemists were not encouraged to be active in the ACS. To help retain this large community (with many analytical chemists in it) he initiated the *Journal of Industrial and Engineering Chemistry* during his term as President of the ACS. Harvey Wiley was instrumental in passage of the Pure Food and Drug Act in 1906 as head of the Bureau of Chemistry in the U.S. Department of Agriculture, which eventually became today's Food and Drug Administration. Finally, analytical chemist Theodore W. Richards was both President of the ACS and first American recipient of the Nobel Prize in Chemistry in 1914.

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## ■ FIRST STEPS IN FORMING THE DIVISION<sup>2</sup>

The ACS did not have divisions during its first 30 years. The National Meetings of the Society were general meetings with attendance of at most a few hundred. In the December 1904 meeting in Philadelphia for the first time sections covering specific areas of chemistry were allowed to meet after the general meeting was over. There was enough interest in a number of these sections that in 1908 five of them were approved to become Divisions of the ACS: Agricultural and Food Chemistry, Fertilizer Chemistry, Industrial Chemists and Chemical Engineers, Organic Chemistry, and Physical and Inorganic Chemistry. The latter division included analytical chemistry both in its programs and in designating officers to represent the field. At some point an Analytical Chemistry Section was organized within the Division of Physical and Inorganic Chemistry.<sup>3</sup> By the early 1930s, analytical chemistry was expanding rapidly due to the introduction of microchemical techniques, and a Microchemical Section of the division was organized in 1936. By 1938 the section had grown, and the ACS Council authorized formation of the Division of Microchemistry at its Fall National Meeting.

## ■ FROM DIVISION OF MICROCHEMISTRY TO DIVISION OF ANALYTICAL CHEMISTRY<sup>4</sup>

The new division held its first sessions at the Spring 1939 National Meeting of the ACS. At the same time, the members of the Analytical Chemistry Section voted to become independent of the Division of Physical and Inorganic Chemistry. A committee of leaders in the analytical community<sup>5</sup> met with the leaders of the Division of Microchemistry and reached an agreement to merge the two groups to form the Division of Analytical and Micro Chemistry.<sup>6</sup> The ACS Council approved the merger, and the new division began programming in 1941. Members were allowed to submit papers for the “Micro” or “Analytical” portions of the programs, with additional joint sessions also offered. In the course of the decade more and more of the papers presented at the Division’s sessions were focused on development and application of new instrumentation, reaching 50% already in 1946.<sup>7</sup>

An important development occurred in 1947: *Analytical Chemistry* became an independent ACS journal. The *Analytical Edition of Industrial and Engineering Chemistry* had been started in 1929 and had become a monthly supplement to *I&EC* in 1937. In 1942 Walter J. Murphy became the editor of the *Analytical Edition*. He expanded the scope of the journal beyond its prior emphasis on analytical methods and news by inviting research papers, especially on new instrumental techniques, and adding experts in instrumentation (such as Ralph H. Mueller and M. G. Mellon) to the editorial advisory board. One survey done at the time the journal became independent said that 57% of the members of the ACS used the *Analytical Edition* regularly.<sup>8</sup>

In 1948, the first of a series of Summer Symposia sponsored by the Division and the Journal took place at Northwestern University in Evanston, Illinois. The topic was “Nucleonics and Analytical Chemistry”. These symposia were held nearly every summer for 45 years, generally hosted at research universities and scientific institutes in the United States and Canada and covering a wide range of topics. *Analytical Chemistry* published papers from the first 10 symposia and included summaries of the more recent ones in its A-pages. Today’s strong ties

between the Division and the Journal are based on such cooperation from the beginnings of their independence. For example, the initial Journal editorial for 1949 is devoted to the Division and “A Division Membership Goal of 1000” (dues were one dollar) and the Division’s program plans for the year.<sup>9</sup>

The Division’s membership indeed was growing and so was its visibility within the ACS. The 10th anniversary of the Division was celebrated at the Midwest session of the 114th National Meeting of the ACS.<sup>10</sup> This meeting featured the presentation of the first Fisher Award in Analytical Chemistry to N. Howell Furman of Princeton University, who gave his address on “Electrical Methods of Analysis” to an audience of 500.<sup>11</sup>

In 1949, the name of the Division was changed to Division of Analytical Chemistry, as “the field had broadened to such an extent that microchemistry was only one of a large number of disciplines represented in the continually growing field of analytical chemistry.”<sup>12</sup> A second significant development in this year was the establishment of the Graduate Fellowship in Analytical Chemistry by Merck & Co., Inc. This fellowship was awarded for nearly 10 years and was the predecessor of a larger program that is still active in 2013.

## ■ EXPANSION OF THE DIVISION OF ANALYTICAL CHEMISTRY IN THE 1950S AND 1960S

The 1950s saw the scope of analytical chemistry expand as a wide range of instrumentation became available commercially and as research in the field increasingly focused on new kinds of instruments and improvements in existing ones. Reflecting this development, the ACS Award in Chemical Instrumentation was initiated in 1955 (it became a Divisional Award in 1976) and the ACS Award in Chromatography in 1961.

In the 1960s the Division initiated several programs to recognize students in the field. Graduate Fellowships for summers were awarded beginning in 1966, with full-year fellowships added in 1970. Both of the fellowships are highly competitive and many of the recipients have made (and are making today) noteworthy contributions to the discipline in their careers. Nearly 500 fellowships have been awarded as of 2013. We are grateful to the organizations that currently support these awards, including Eli Lilly and Company, Agilent Technologies, Eastman Chemical Company, and the Society for Analytical Chemists of Pittsburgh.

The Undergraduate Award in Analytical Chemistry was begun in 1966 to honor outstanding students at colleges and universities in the United States and Canada and as a means to attract them to careers in our discipline. Each institution that regularly graduates chemistry majors is invited to nominate a student for the award which includes membership in the Division for a year. More than 300 of these awards are made by the Division each year.

## ■ GROWTH OF THE DISCIPLINE AND THE DIVISION FROM THE 1970S TO THE PRESENT

The 1970s saw the start of a dramatic growth in the discipline of analytical chemistry, and the Division of Analytical Chemistry saw a comparable growth in membership and in interest in its programs and activities. After 20 years of relatively stable numbers, the Division’s membership began to increase significantly in the mid 1970s, from an average of 3200 in the period 1966 through 1975 to 4631 in 1980, 6741 in 1985, to a

peak membership of 12 067 in 2000 (but decreasing to the current 8302 in November 2012).<sup>13</sup>

Larry Faulkner, then President of the University of Texas, Austin, saw these factors as driving the renewal of the discipline in his talk at the 2001 Pittsburgh Conference:<sup>14</sup> (i) “the rapid success of the environmental movement”, (ii) “the very broad impact of the quality movement”, (iii) “advances in chemically-based health care”, (iv) “the explosion of the microelectronics industry”, and (v) “the development of information technology based on microprocessors”.

Today progress in the first three areas is driven to a great extent by advances in analytical chemistry. Also, the availability of analytical instrumentation using the newest technology from the fourth and fifth areas has in turn enabled many major developments in our discipline that are providing completely new analytical capabilities.

As the Division grew, it became necessary to have the management of basic services for the membership handled by a professional office. This is now based at Scientific Association Management in Santa Fe, New Mexico, and provides support for the officers and committees of the Division in addition to responding to requests from the members.

The increasing importance of modern analytical separations techniques led to the formation of the Subdivision of Chromatography and Separations Chemistry<sup>15</sup> in 1985. The Subdivision organizes one or more symposia in the Division’s program at Pittcon and the ACS National Meetings. It also presents the Award for Young Investigators in Separations Science (initiated in 2004 and sponsored by Agilent Technologies). The Subdivision currently has 1490 members and is one of the four largest of the 26 current ACS subdivisions.

In response to the growing interest in all aspects of analytical chemistry, the Division initiated five new annual awards during the 1980s and 1990s: (i) The Award for Excellence in Education, presented for the first time in 1983 to I. M. Kolthoff and now named in memory of J. Calvin Giddings; (ii) The Award in Spectrochemical Analysis, presented for the first time in 1987 to James D. Winefordner; (iii) The Award in Electrochemistry, presented for the first time in 1988 to Allen J. Bard; (iv) The Arthur F. Findeis Award for Achievements by a Young Analytical Scientist, presented for the first time in 1996 to Jay K. Trautman (sponsored by Philip Morris USA); and (v) The Award for Distinguished Service in the Advancement of Analytical Chemistry, presented for the first time in 1998 to Henry N. Blount, III (sponsored by Waters Corporation).

Analytical chemistry today has become an essential aspect of basic research and development as well as many applications ranging from health care to protecting our environment to space science and for many aspects of public policy worldwide. The Division has responded to this by expanding its programming at ACS National Meetings through collaborations with many other technical divisions. In 2012, for example, the Division programmed with 18 of the 31 other ACS divisions.<sup>16</sup> The Division also is an active participant in the Program Themes selected for the ACS National Meetings, such as Chemistry for Energy & Food at the Spring 2013 meeting in New Orleans and Chemistry in Motion at the Fall 2013 meeting in Indianapolis.

The Division also supports a variety of specialized meetings. In 1973 it joined with several analytical organizations to found the Federation of Analytical Chemistry and Spectroscopy

Societies (FACSS), which today annually presents the SciX national meeting.<sup>17</sup> The Division also became a participant in the Eastern Analytical Symposium,<sup>18</sup> which serves the large analytical community in the northeastern United States. Most recently, the Division began programming symposia at the annual Pittcon,<sup>19</sup> starting with the 2007 meeting in Chicago and emphasizing topics that connect fundamental analytical chemistry to key areas of application.

A significant development in the past decade was the Division’s partnership with the Analytical Sciences Digital Library<sup>20</sup> (ASDL). The ASDL began in 2001 under the leadership of Ted Kuwana as part of a National Science Foundation initiative, the National Science Digital Library. ASDL now contains a wide range of resources for teaching all aspects of analytical science. The Division and ASDL share a common Internet infrastructure and collaborate in a variety of ways.

## ■ WHAT IS NEXT?

Looking to the future, it is clear that our science will be an essential part of nearly every fundamental and applied aspect of chemistry. It is harder, however, to predict how the role of the Division will develop. It will continue to support the members of the analytical science community by organizing outstanding symposia at major scientific meetings, including joint symposia that demonstrate how analytical chemistry is critical for progress in other areas of chemistry, by presenting awards that recognize current and future leaders and outstanding students, and by providing opportunities for members to come together socially as well as intellectually. However, rapid changes are taking place in how scientists interact and in how research is communicated, and the Division will need to develop new approaches to serving its community.

Two significant changes can be anticipated. First, the membership of the Division (and the ACS) shows an increasing proportion in two categories: members who are outside the United States and members who are students. More than 1100 of the 8300 members of the Division at the end of 2012 live outside the U.S.<sup>21</sup> Nearly 40% of those members who list their country are in East or South Asia or Australia/New Zealand, but the numbers also are growing in the rest of the world. In the future, the Division will need to forge closer ties with these members, for example, through more active participation in joint meetings and through more Division symposia that include scientists from outside the United States.

At the end of 2012, there were 1500 student members, 18% of the total Division membership. These members receive recognition from the Division in several ways, including the Undergraduate Awards and Kolthoff Travel Awards, Graduate Fellowships, and participation in very popular poster sessions at ACS National Meetings. The Division will need to provide an increasing number of activities for these members in the future.

Second, the Division will need to provide resources for its members in entirely new ways. Printed materials, such as abstract books for its ACS National Meeting programs, were sent regularly to every member for the first 65 years of the Division’s existence. Today these materials are available online. The Division leadership is working to take advantage of the new forms of communication enabled by the Internet to provide new benefits for the membership, but much more work needs to be done.

The Division’s next anniversary will undoubtedly also be a celebration of the growing significance of analytical chemistry.

Our field will continue to enable progress in all areas of science, and it will be essential for the most important practical interests of the general public. Let us look forward to our bright future as we celebrate the successes of the past and present!

## AUTHOR INFORMATION

### Corresponding Author

\*E-mail: roland.hirsch@science.doe.gov.

### Notes

The author declares no competing financial interest.

### Biography

Roland F. Hirsch is a program manager in the Office of Biological & Environmental Research in the Office of Science of the U.S. Department of Energy. Previously he was on the staff of the National Center for Research Resources at the National Institutes of Health and a member of the faculty of the Department of Chemistry at Seton Hall University. He has served as Secretary of the Division of Analytical Chemistry 1980–1983, Chair 1987–1988, Councilor 1995 to the present, and Web Editor 1995 to the present.

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- (5) Hobart H. Willard of the University of Michigan, N. Howell Furman of Princeton University, I. M. Kolthoff of the University of Minnesota, and G. Frederick Smith of the University of Illinois, Urbana-Champaign.
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- (11) Anon.. *Chem. Eng. News* **1948**, *26*, 2757–2758. The official name of the award is the ACS Award in Analytical Chemistry, but it was widely known as the “Fisher Award” in recognition of its sponsorship by Fisher Scientific from 1948 through 2002. It is now sponsored by the Battelle Memorial Institute.
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- (15) See <http://www.analyticalsciences.org/separationsubdivision.php> for more information.
- (16) At the most recent National Meetings, in March 2012 in San Diego, CA and in August 2012 in Philadelphia, PA the Division’s symposia were cosponsored by 11 other divisions (BIOL, BMGT, CELL, CHED, COLL, ENVR, I&EC, ORGN, PHYS, SCHB, and TOXI), while the Division was a cosponsor of sessions involving 17 other Divisions (AGFD, BIOL, CELL, CHAL, CHED, CINF, COLL, COMP, ENVR, I&EC, MEDI, ORGN, PHYS, PMSE, PROF, SCHB, TOXI).
- (17) SCIX: The Great Scientific Exchange, presented by the Federation of Analytical Chemistry and Spectroscopy Societies, of which the Division is a Charter Member: <http://scixconference.org/>
- (18) The Eastern Analytical Symposium and Exposition: <http://www.easinc.org/>
- (19) Pittcon is organized by The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, a Pennsylvania not-for-profit educational corporation which is comprised of the Spectroscopy Society of Pittsburgh (SSP) and the Society for Analytical Chemists of Pittsburgh (SACP): <http://pittcon.org/>
- (20) <http://www.asdlib.org/>
- (21) ACS Demographics Report of November 30, 2012.