

Citation for Chemical Breakthrough Award Program Update (Up To and Including the 2019 Award Year)

Jeffrey I. Seeman
Award Committee Secretary

September 17, 2020

Summary

- Fourteen years of awards (2006 –2019) have been completed including four awards for the 2019 award year.
- As of January 1, 2020, 71 CCB Awards have been presented to date at 80 sites (due to multiple collaborations and locations) in 12 countries (not including the 2020 award year). The countries are: Canada, England, France, Germany, Italy, Latvia, The Netherlands, Poland, Russia, Scotland, Switzerland, and the United States.
- Status for the 2020 award year: The awards committee has completed its task and four awardees have been selected. These awardees are now being notified. Drafts of the four plaques are being prepared and will be sent to the manufacturer for production once they have been approved by the recipients.
- CCB Awards are plaques given to institution from which the research was published.
- We provide assistance with and generally participate in award ceremonies.
- Three award presentations occurred (at CAS in Columbus, Ohio; Karlsruhe Institute of Technology; and Princeton University).
- Photographs and associated text dealing with the 13-years of award ceremonies are found on the CCB Award's web pages.
http://www.scs.illinois.edu/~mainzv/HIST/awards/citations_chem-breakthroughs.php
- The CCB Award program now has many and an increasing number of links on Wikipedia.
- The CCB Award program also has a link and a large description of the program on the ACS National Historic Chemical Landmarks Program (see below).

Objectives, Strategies and Criteria of the Citations for the Chemical Breakthrough Award Program

The Citations for Chemical Breakthrough Award program is intended to honor and celebrate the achievements in chemistry and the molecular sciences in a publicly visible fashion. Through the involvement of the recipient institutions in the design of the plaques and in the organization and hosting of award celebrations, the program will “expand people’s minds through the enlightening power of the history of chemistry. It will bring history of chemistry to scientists and bring scientists to the history of chemistry.”

The Citations for Chemical Breakthrough award recognizes breakthrough publications, books and patents worldwide in the field of chemistry. The term “breakthrough” refers to advances in chemistry that have been revolutionary in concept, broad in scope, and long term in impact. The award consists of a very high quality plaque, to be placed at a site selected by the recipient near the office or laboratory where the breakthrough was achieved. Each award will be made to the department or institution where the breakthrough occurred, not to the individual scientist(s).

Elaboration of criteria

- “Revolutionary” implies some sort of change in practice or theory after the appearance of the patent or publication.
- “Broad in scope” implies an advance that permeates a sub-discipline of chemistry, or that has applications in more than one sub-discipline, or that has a significant benefit to society.
- “Long-term” implies a minimum of twenty five years since the date of publication.

A tabulation of number of awards per year follows on the next page.

Number of Citation for Chemical Breakthrough Award by Year

| | Award Year | Number Awarded | Duplicates due to multiple collaborative sites | Duplicates due to researcher associated with other locations |
|----|--------------|----------------|--|--|
| 1 | 2006 | 10 | | |
| 2 | 2007 | 5 | 1 | 2 |
| 3 | 2008 | 6 | | 1 |
| 4 | 2009 | 5 | | 1 |
| 5 | 2010 | 5 | | |
| 6 | 2011 | 5 | | |
| 7 | 2012 | 4 | | 3 |
| 8 | 2013 | 4 | | |
| 9 | 2014 | 4 | | |
| 10 | 2015 | 5 | | |
| 11 | 2016 | 4 | | |
| 12 | 2017 | 4 | | |
| 13 | 2018 | 6 | | |
| 14 | 2019 | 4 | | 1 |
| 15 | 2020 | To be awarded | | 0 |
| | Total sites* | 71 | 1 | 8 |

* For instances in which the award publication resulted from a collaboration at two or more institutions, the “Total” represents each of these as a single award. For instances in which a duplicate plaque was provided to the researcher’s current institution, the “Total” does not include this duplication.

The members of the 2019 Award Committee are listed below (next page) and also on the HIST website (with the Award Committee members from the earlier award years).

- The program has received excellent responses in the USA and Europe. To date, no awards have been presented to Asia, the Middle East or South America.
- Nominations are open to all and are advertised on HIST’s website and in an announcement in *C&EN*.
- The plaque-design process is much more difficult than anticipated. It is often hard to obtain the required high quality scans of original publications from the 19th Century. There have been design issues with the recipient organizations.
- We have received extraordinary cooperation from the plaque manufacturer, Stellar Kent (<http://www.stellarkent.com/index.php>). In fact, in 2014, HIST Certificate of

Appreciation Awards were given to Carol Hall, Linda Mason, and the Stellar Kent Corporation for their work on the CCB award program.

- As of past years, the Linda Hall Library of Science, Engineering and Technology (Kansas City, MO) has donated several high quality images of journal articles, if available, at no charge for the award program

**Award Committee Members
2019 – 2020**

Anthony G. M. Barrett, F.R.S. (Imperial College of Science, Technology and Medicine)
Michael Bowers (University of California, Santa Barbara)
Carmen Giunta (Le Moyne College)
Harry Gray (Caltech)
Dudley Herschbach (Harvard)
Peter Morris (Science Museum London, retired)
Amos Smith (Penn)
Jeffrey I. Seeman, Committee Secretary (Non-voting) (University of Richmond)

Finances and Donations

- The plaques cost ca. \$350 each including shipping to the USA. Shipping to Europe is another \$75 - \$100.
- Initial funding
 - \$10K from ACS DAC Innovative Grant
 - \$10K from ACS Corporate Associates
 - \$6K from ACS DAC Innovative Grant for Local Section travel
 - Funds from individual donors (donations continues to this day)
- HIST currently provides 50% matching to an annual donation (individual donor, \$1500/year; HIST, \$750/year).
- Annual costs ca. \$1700 - \$2200/year.
- Annual income ca. \$2250/year.
- As of June 1, 2020 (prior to HIST's contribution and pledged donation for 2020), \$881.56 is available for the plaque program (excluding travel, see bullet statement immediately below).
- Based on the latest update available for HIST Treasurer Vera Mainz, there is \$4103.16 available for travel support for local section and related representation (ACS Innovative Grant Program).

Website

The HIST website contains high quality images of all the plaques and much supplementary information, including photographs of many awards ceremonies, ceremony agenda, and related materials.

http://www.scs.illinois.edu/~mainzv/HIST/awards/citations_chem-breakthroughs.php

The CCB award program's website is exceptional and expanding, thanks to the continuing excellent work of Vera Mainz. The website is organized by award year. Originally, there was only a table of all award winners for each year (from 2006 when the first awards were presented). From that page, one could and can see the award plaques for each winner as well as the supplementary material associated with that award. In 2014, several new pages were added that provide the visitor with rapid access to the awardees, organized by name OR location OR date of the awardee's publication.

We are fortunate that most of the recipients have provided photographs and other information about their presentation ceremonies, etc. for use on our website.

CCB Award on the ACS Historic National Historic Chemical Landmarks Program Website

On the “About the ACS Historic National Historic Chemical Landmarks Program” web page, <https://www.acs.org/content/acs/en/education/whatischemistry/landmarks/about.html> the following text and link appears:

Citation for Chemical Breakthrough Awards

Since 2006, the Citation for Chemical Breakthrough Award program, administered by the ACS Division of the History of Chemistry, has honored scientific publications, books and patents that have been revolutionary in concept and broad in scope, and that forever changed the face of chemistry.

In 2019, four awards were made:

- CAS, a Division of the American Chemical Society, for *Chemical Abstracts*, first published in 1907
- Karlsruhe Institute of Technology, Germany, for Fritz Haber and R. Le Rossingol's 1913 paper on nitrogen fixation
- The University of Manchester, England, for M. G. Evans and M. Polanyi's 1935 paper on the transition state
- Princeton University, for Henry Eyring's 1935 paper on the transition state

More information is available on the HIST Citation Awards webpage.

On the CCB Award's website, the following appears:

The [National Historical Chemical Landmarks \(NHCL\) program](#), administered by the American Chemical Society, honors "seminal achievements . . . to chemistry and society in the U.S."

In 2017, two Landmarks were awarded:

- Infrared Spectrometer and the Exploration of Mars
- Chlorofluorocarbons and Ozone Depletion

In 2018, one Landmark was awarded:

- Plutonium-238 Production for Space Exploration

In 2019, three Landmarks were awarded:

- St. Elmo Brady, the First African-American Ph.D. in Chemistry
- Innovation in Steroid Medicines at Upjohn
- The Combination of Gas Chromatography and Mass Spectrometry at Dow Chemical

The first NHCL Landmark was awarded in 1993 for Bakelite: The World's First Synthetic Plastic.

The 2019 awards are listed in the graph below, taken from the CCB Award web site that is housed on the HIST website that is designed and maintained by Vera Mainz.

The graphic is taken from the HIST website:

http://www.scs.illinois.edu/~mainzv/HIST/awards/citations_chem-breakthroughs.php

| Scientists/Inventors | Breakthrough Publication (If text is in color, this is a live link to the plaque.) | Location of Award (If text is in color, this is a live link to photographs and other materials related to the presentation.) |
|------------------------------|---|---|
| American Chemical Society | Chemical Abstracts (Volume 1 was published in 1907). | CAS, Columbus, Ohio |
| F. Haber and R. Le Rossignol | "Über die technische Darstellung von Ammoniak aus den Elementen [On the Technical Synthesis of Ammonia from the Elements]," <i>Zeitschrift für Elektrochemie</i> , 1913 , 19, 53-72. | Karlsruhe Institute of Technology |
| H. Eyring | "The Activated Complex in Chemical Reactions," <i>J. Chem. Phys.</i> 1935 , 3, 107-115. | Princeton University* |
| M. G. Evans and M. Polanyi | "Some Applications of the Transition State Method to the Calculation of Reaction Velocities, Especially in Solution," <i>Trans. Faraday Soc.</i> 1935 , 31, 875-894. | University of Manchester * |

* Multiple simultaneous independent discoveries.

The 2019 award plaques are shown at the very end of this report. All plaques are also found on the HIST website under HIST Awards, Citation for Chemical Breakthrough Award. The blue link in the second column leads the web visitor to that award's plaque.

The four 2020 award plaques are shown on the next pages.

Following the award plaques are photographs of several of the award ceremonies and the placement of the award plaques.



Division of the History of Chemistry
American Chemical Society

Citation for Chemical Breakthrough



Published Semi-monthly

Price, \$6.00 Per Annum

Chemical Abstracts

Published by the

American Chemical Society

Publication Office, Easton, Pa.

Volume I, No. 1

JANUARY 1, 1907

Editor, William A. Noyes

Associate Editor, C. E. Waters

Assistant Editors and Abstractors

| | | | |
|---------------------|-------------------|---------------------|---------------------|
| E. T. Allen | Thomas Evans | H. C. Lythgoe | J. B. Tingle |
| M. C. Albrecht | K. G. Falk | M. Matsui | L. M. Tolman |
| Louis Anderson, Jr. | Henry Fay | H. N. McCoy | H. A. Torrey |
| K. Ano | Peter Fireman | Lafayette B. Mendel | F. F. Underhill |
| W. C. Attem | H. E. Frees | J. L. Miner | L. L. Van Slyke |
| S. H. Avers | L. H. Friedburg | C. E. Munroe | F. P. Veitch |
| G. E. Briston | R. B. Gibson | E. H. Newham | Robert Wahl |
| W. D. Bigelow | J. Elliott Gilpin | Fred Neher | W. H. Walker |
| A. V. Beinlinger | H. C. Gore | A. Nison | L. E. Warren |
| W. H. Biome | R. D. Hall | Charles R. Oberfell | E. W. Washburn |
| M. T. Bogert | Edward Hart | F. A. Olmstead | L. E. Weber |
| W. C. Bray | B. G. Hartman | L. A. Olney | E. Weintraub |
| T. Linton Briggs | L. F. Hawley | Y. Osaka | R. C. Wells |
| M. J. Brown | Edward Hewitt | J. D. Pennock | Josef Westesson |
| C. A. Browne, Jr. | W. F. Hillebrand | J. H. Pettit | R. S. Weston |
| A. W. Browne | A. W. Hoppenstedt | S. E. Prescott | A. S. Wheeler |
| V. J. Chambers | M. Hookey | J. W. Richards | G. R. White |
| E. M. Chamot | G. A. Hulett | W. D. Richardson | Theodore Whittelsey |
| N. H. Chausen | M. A. Hunter | R. C. Robinson | W. R. Whitney |
| C. M. Corson | T. B. Johnson | A. H. Rubin | C. E. A. Winslow |
| B. S. Cushman | L. W. Jones | S. E. Sadler | A. L. Winton |
| F. B. Dains | C. A. Kraus | W. T. Schaller | B. S. Witmer |
| A. L. Dean | L. P. Kinlicutt | Aug. Schmidt | C. G. L. Wolf |
| William Dehn | O. Krub | W. H. Seamon | H. J. Wood |
| L. M. Dennis | M. Kubara | Atherton Seidell | S. O. Woodruff |
| T. G. Delbridge | A. B. Lamb | H. J. Skinner | J. H. Yocum |
| M. G. Donk | W. S. Landis | Alexander Smith | Y. Yoshikawa |
| R. E. Doehlin | C. F. Langworthy | C. M. P. Smith | El. Yoshida |
| H. W. Doughty | N. A. Laury | R. C. Snowdon | H. S. York |
| Harry Drew | Victor Lenher | R. B. Soeman | Adolph Zeile |
| W. L. Dubois | G. N. Lewis | A. B. Stevens | |
| Charles Eachus | A. D. Little | E. C. Sullivan | |
| Paul Escher | C. E. Linebarger | O. D. Swett | |

Application in the Post-Office, Easton, Pa., for Entry as Second-Class Matter

Copyright, 1907, by WILLIAM A. NOYES, Chairman of the Committee on Papers and Publications of the American Chemical Society.

THE CHEMICAL PUBLISHING CO., EASTON, PA.

Presented to CAS, a Division of the American Chemical Society, 2019.



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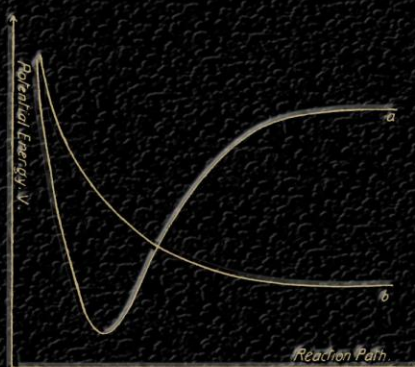
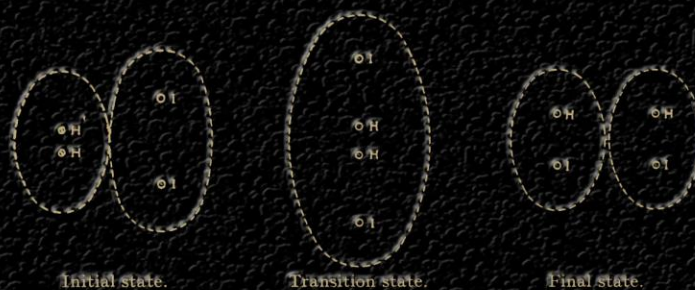


Transactions of the Faraday Society 1935, *31*, 875-894.

SOME APPLICATIONS OF THE TRANSITION STATE METHOD TO THE CALCULATION OF REACTION VELOCITIES, ESPECIALLY IN SOLUTION.

By M. G. EVANS AND M. POLANYI.

Received 12th March, 1935.



Presented to the University of Manchester, 2019.



Division of the History of Chemistry
American Chemical Society

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Journal of Chemical Physics 1935, 3, 107-115.

The Activated Complex in Chemical Reactions

HENRY EYRING, *Frick Chemical Laboratory, Princeton University*
(Received November 8, 1934)

The calculation of absolute reaction rates is formulated in terms of quantities which are available from the potential surfaces which can be constructed at the present time. The probability of the activated state is calculated using ordinary statistical mechanics. This probability multiplied by the rate of decomposition gives the specific rate of reaction. The occurrence of quantized vibrations in the activated complex, in degrees of freedom which are unquantized in the original molecules, leads to relative reaction rates for isotopes quite different from the rates predicted using simple kinetic theory. The necessary conditions for the general statistical treatment to reduce to the usual kinetic treatment are given.

$$k_{\ddagger} = c(F_{\ddagger} / F_{\eta}) (\bar{p} / m^*) = c(F_{\ddagger}^{\ddagger} / F_{\eta}) (kT/h) e^{-E_0 / kT}$$

Presented to the Department of Chemistry, Princeton University, 2019.



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ZEITSCHRIFT FÜR ELEKTROCHEMIE.

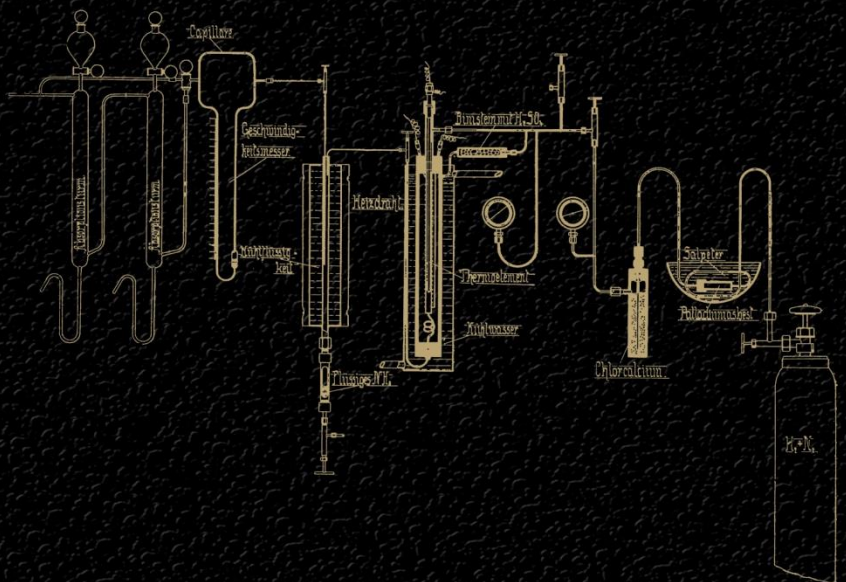
Z. f. Elektroch. Bd. **19.**

15. Januar 1913.

Nr. 2. (S. 53—108.)

ÜBER DIE TECHNISCHE DARSTELLUNG VON AMMONIAK
AUS DEN ELEMENTEN 1).

Von F. Haber und R. Le Rossignol.



Presented to the Karlsruhe Institute of Technology, 2019.