American Chemical Society
Division of the History of Chemistry

Program and Abstracts

236th ACS National Meeting
Philadelphia, PA
August 17-21, 2008

J. S. Jeffers, Program Chair

HIST

DIVISION OF THE HISTORY OF CHEMISTRY

Final Program, 236th ACS National Meeting, Philadelphia, PA, August 17-21, 2008

J. S. Jeffers and S. C. Rasmussen, *Program Chairs*

SOCIAL EVENTS:
Edelstein Award Presentation, 4:40 pm: Tue
Edelstein Award Dinner, Maggiano's Little Italy, 7:00 pm: Tue

BUSINESS MEETING:
HIST Business Meeting 3:15 pm: Mon

SUNDAY MORNING

Hilton Garden Inn -- Salon C/D (http://www.hiltongardenphilly.com/)

General Papers
J. S. Jeffers, *Organizer*
S. C. Rasmussen, *Presiding*

9:00 —1. Three questions of former ACS president Katie Hunt. **E. Klingsberg**
9:30 —2. Charles Lathrop Parsons, Mr. ACS: Early and New Hampshire years. **C. J. Murphy**
10:00 —3. Jonas Kamlet (1914-1960): Chemist/entrepreneur. **D. F. Martin**, B. B. Martin
10:30 — Intermission.
10:45 —4. Medical Research Council Laboratory of Molecular Biology: Years since 1962. **J. S. Jeffers**
11:15 —5. 150 Years of organic structures. **D. E. Lewis**

100th Anniversary Symposium
Retrospective
Crown Plaza Hotel (http://www.cpphiladelphia.com/)
Sponsored by AGFD, Cosponsored by HIST and PRES

Fundamental Advances in Contemporary NMR Spectroscopy
Frontiers in Solid State Biomolecular NMR
Lowes Hotel (http://www.loewshotels.com/en/Hotels/Philadelphia-Hotel/Overview.aspx)
Sponsored by PHYS, Cosponsored by HIST and HEALTH

Pioneers of Chemical Information
Sofitel Hotel (http://www.sofitel.com/sofitel/fichehotel/gb/sof/2741/fiche_hotel.shtml)
Sponsored by CINF, Cosponsored by HIST

SUNDAY AFTERNOON

Hilton Garden Inn -- Salon C/D (http://www.hiltongardenphilly.com/)

General Papers
J. S. Jeffers, *Organizer, Presiding*

1:30 —6. Boettger's eureka! New insights into the European rediscovery of porcelain. **N. Zumbulyadis**
2:00 —7. How G.N. Lewis and Theodore Richards missed the third law of thermodynamics. **P. Coffey**
2:30 —8. Overcoming adversity: Triumph and tragedy in the life and career of Lawrence Knox, black American chemist. **L. Gortler**, S. J. Weininger
3:00 — Intermission.
3:15 —9. History of high output experimentation in chemistry. **J. G. Schroer III**
3:45 —10. Setting the record straight: HIST archives. **J. J. Bohning**

100th Anniversary Symposium
Progress in Food and Beverage Chemistry
Crown Plaza Hotel (http://www.cpphiladelphia.com/)
Sponsored by AGFD, Cosponsored by HIST and PRES

Pioneers of Chemical Information
Sofitel Hotel (http://www.sofitel.com/sofitel/fichehotel/gb/sof/2741/fiche_hotel.shtml)
Sponsored by CINF, Cosponsored by HIST

Preserving our Chemical Heritage: Cool Collections
Sofitel Hotel (http://www.sofitel.com/sofitel/fichehotel/gb/sof/2741/fiche_hotel.shtml)
Sponsored by CINF, Cosponsored by HIST

MONDAY MORNING

Hilton Garden Inn -- Salon B (http://www.hiltongardenphilly.com/)

Classic Books in Chemistry V: Chemical Engineering
Cosponsored by Bolton Society and CINF
J. J. Bohning, *Organizer, Presiding*

8:50 — Introductory Remarks. .
8:55 —11. F.H. Thorp's *Outlines of Industrial Chemistry*. **G. D. Patterson**
9:30 —12. George E. Davis: A voice crying in the Midlands. **M. E. Bowden**
10:05 —13. *Principles of Chemical Engineering* by William H. Walker, Warren K. Lewis, and William H. McAdams. **R. Reynolds**
10:40 — Intermission.

10:50 —14. *Transport Phenomena*: Success story in perspective. **B. L. Tarmy**
11:25 —15. Perry's heavyweight handbook for chemical engineers. **D. H. M. Bowen**

100th Anniversary Symposium
Progress in Food Components
Crown Plaza Hotel (http://www.cpphiladelphia.com/)
Sponsored by AGFD, Cosponsored by HIST and PRES

Centennial of the Physical Division: Celebrating the Past, Embracing the Future
Lowes Hotel (http://www.loewshotels.com/en/Hotels/Philadelphia-Hotel/Overview.aspx)
Sponsored by PHYS, Cosponsored by PRES and HIST

Legends of Environmental Chemistry
Doubletree Hotel (http://doubletree1.hilton.com/en_US/dt/hotel/PHLBLDT-Doubletree-Hotel-Philadelphia-Pennsylvania/index.do)
Sponsored by ENVR, Cosponsored by ES&T and HIST

The Evolution of Analytical Sciences in the U.S
Marriott Courtyard (http://www.marriott.com/hotels/travel/phldc-courtyard-philadelphia-downtown/)
Sponsored by ANYL, Cosponsored by HIST

MONDAY AFTERNOON

Hilton Garden Inn -- Salon B (http://www.hiltongardenphilly.com/)

Classic Books in Chemistry V: Chemical Engineering
Cosponsored by Bolton Society and CINF
J. J. Bohning, *Organizer, Presiding*

2:00 —16. My name is not Kirk Othmer: Brooklyn Poly, Interscience, and the Encyclopedia of Chemical Technology. **J. J. Bohning**
2:35 —17. *The Process Engineers Pocket Handbook* and other guides. **F. Wood-Black**

Hilton Garden Inn -- Salon B (http://www.hiltongardenphilly.com/)

3:15 — HIST Business Meeting
Roger Egolf, *Presiding*

Hilton Garden Inn -- Salon B (http://www.hiltongardenphilly.com/)

200 Years of Atoms in Chemistry: From Dalton's Atoms to Nanotechnology
C. J. Giunta, *Organizer, Presiding*

3:45 — Introductory Remarks.
3:50 —18. Four centuries of atomic theory: An overview. **W. B. Jensen**
4:30 —19. Atomic theory before Dalton. **L. May**

100th Anniversary Symposium
Health, Safety and Legal Issues
Crown Plaza Hotel (http://www.cpphiladelphia.com/)
Sponsored by AGFD, Cosponsored by HIST and PRES

Centennial of the Physical Division: Celebrating the Past, Embracing the Future
Lowes Hotel (http://www.loewshotels.com/en/Hotels/Philadelphia-Hotel/Overview.aspx)
Sponsored by PHYS, Cosponsored by PRES and HIST

Legends of Environmental Chemistry
Doubletree Hotel (http://doubletree1.hilton.com/en_US/dt/hotel/PHLBLDT-Doubletree-Hotel-Philadelphia-Pennsylvania/index.do)
Sponsored by ENVR, Cosponsored by ES&T and HIST

MONDAY EVENING

Pennsylvania Convention Center -- Hall C (http://www.paconvention.com/home/)

Sci-Mix
J. S. Jeffers, *Organizer*

8:00 - 10:00

5-6. See previous listings.
22. See subsequent listings.

TUESDAY MORNING

Hilton Garden Inn -- Salon B (http://www.hiltongardenphilly.com/)

200 Years of Atoms in Chemistry: From Dalton's Atoms to Nanotechnology
C. J. Giunta, *Organizer, Presiding*

8:45 — Introductory Remarks.
8:50 —20. Epistemic status of Dalton's atomic theory. **A. J. Rocke**
9:20 —21. Atomic debates revisited. **W. H. Brock**
9:50 —22. Atoms are divisible: The pieces have pieces. **C. J. Giunta**
10:20 — Intermission.
10:30 —23. Eyes to see: Physical evidence for atoms. **G. D. Patterson**
11:00 —24. Atomic travelogue: Virtual tour of atomism. **J. L. Marshall**, V. R. Marshall
11:30 —25. Teaching the atomic theory: A visual-historical approach. **D. A. Katz**

Centennial of the Physical Division: Celebrating the Past, Embracing the Future
Lowes Hotel (http://www.loewshotels.com/en/Hotels/Philadelphia-Hotel/Overview.aspx)
Sponsored by PHYS, Cosponsored by PRES and HIST

Legends of Environmental Chemistry
Doubletree Hotel (http://doubletree1.hilton.com/en_US/dt/hotel/PHLBLDT-Doubletree-Hotel-Philadelphia-Pennsylvania/index.do)
Sponsored by ENVR, Cosponsored by ES&T and HIST

Preservation Issues for the Digital Library
Sofitel Hotel (http://www.sofitel.com/sofitel/fichehotel/gb/sof/2741/fiche_hotel.shtml)
Sponsored by CINF, Cosponsored by HIST

TUESDAY AFTERNOON

Hilton Garden Inn -- Salon B (http://www.hiltongardenphilly.com/)

Edelstein Award Honoring Sir John Rowlinson
Cosponsored by PHYS
W. H. Brock, *Organizer, Presiding*

1:30 — Introductory Remarks.

1:35 —26. August Horstmann and the origins of chemical thermodynamics. **W. B. Jensen**

2:15 —27. Kinetic and thermodynamic magnitudes as quantitative measures of chemical reactivity: Chemistry or physics? **S. J. Weininger**

2:55 — Intermission.

3:10 —28. J. R. Partington (1886-1965): Physical chemistry in deed and word. **W. H. Brock**

3:50 —29. Patrolling the border between physics and chemistry. **J. Rowlinson**

4:40 — Edelstein Award Presentation, Roger A. Egolf, HIST Chair.

Centennial of the Physical Division: Celebrating the Past, Embracing the Future
Lowes Hotel (http://www.loewshotels.com/en/Hotels/Philadelphia-Hotel/Overview.aspx)
Sponsored by PHYS, Cosponsored by PRES and HIST

Legends of Environmental Chemistry
Doubletree Hotel (http://doubletree1.hilton.com/en_US/dt/hotel/PHLBLDT-Doubletree-Hotel-Philadelphia-Pennsylvania/index.do)
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Sponsored by CINF, Cosponsored by HIST

TUESDAY EVENING

Edelstein Award Dinner
J. S. Jeffers, *Organizer*

7:00-9:00 —Maggiano's Little Italy, $50.00
(http://www.maggianos.com/locations/detail.asp?unit_id=001.025.0168)

WEDNESDAY AFTERNOON

Fundamental Advances in Contemporary NMR Spectroscopy
ACS HIST Award for Paul Lauterbur
Lowes Hotel (http://www.loewshotels.com/en/Hotels/Philadelphia-Hotel/Overview.aspx)
Sponsored by PHYS, Cosponsored by HIST and HEALTH

Abstracts

HIST 1 Three questions of former ACS president Katie Hunt
Erwin Klingsberg, 4000 Massachusetts Ave NW, Apt 930, Washington, DC 20016
ACS President Catherine (Katie) T. Hunt framed the discussion by posing three questions: 1) How can ACS encourage more members to participate by bringing their expertise to the development of more targeted policy positions? 2) What can ACS do to increase member involvement in public policy advocacy? 3) How can ACS be a more effective leader in policy activities in the broader science and technology communities? A long-time HIST member will answer these and related questions with special relevance to HIST.

HIST 2 Charles Lathrop Parsons, Mr. ACS: Early and New Hampshire years
Clarence J. Murphy, Department of Chemistry, East Stroudsburg University of Pennsylvania, E. Stroudsburg, PA 18301
Charles Lathrop Parsons was the Secretary and Business Manager of the American Chemical Society from 1907 until he retired in 1945. The ACS had three thousand members in 1907 when he took over and over 43,000 members when he retired. During that time he was the face of the ACS and probably better known than any of the presidents of the Society, known at home and abroad as "Mr. ACS." In 1932 Marston Bogert, ACS President said, "Having closely followed the progress of our Society for the past forty years I say unhesitatingly and without fear of successful contradiction that what the American Chemical Society is today, it owes more to Charles Lathrop Parsons than to any other American chemist. This paper will explore his early life and years as a Professor of Chemistry at New Hampshire College of Agriculture and the Mechanic Arts in Hanover and Durham from 1889 to 1911 when he left for Washington, DC to become the Chief Mineral Chemist of the newly established US Bureau of Mines and then the first full-time Secretary and Business Manager of the American Chemical Society

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HIST 3 Jonas Kamlet (1914-1960): Chemist/entrepreneur
Dean F. Martin, dmartin@cas.usf.edu, Department of Chemistry, University of South Florida, 4202 E. Fowler Avenue, SCA 400, Tampa, FL 33620, Fax: 813-974-8756, and Barbara B. Martin, bmartin@cas.usf.edu, Department of Chemistry, University of South Florida, Tampa, FL 33620
Jonas Kamlet, Ph.D., was a chemist, inventor, and significant entrepreneur who founded Kamlet Laboratories in New York City that became the model of a successful consulting firm. Among his hundreds of patents and inventions were a tablet that could be used to measure glucose in urine, a treated strip that could detect pregnancy, a fodder for ruminants that used newsprint, and biuret (a self-condensation product of urea) that could be used as a non-protein component of fodder. Following his death in an airplane

collision on December 16, 1960, his wife and collaborator (and later a resident of Florida) carried on the work of the firm until her retirement in about1979.

HIST 4 Medical Research Council Laboratory of Molecular Biology: Years since 1962

Joe S. Jeffers, Department of Chemistry, Ouachita Baptist University, 410 Ouachita Street, Box 3786, Arkadelphia, AR 71998-0001, Fax: 870-245-5241

Building on an earlier presentation that focused on the events leading up to the formation of the Medical Research Council's Laboratory of Molecular Biology (LMB), this presentation will focus on the years since 1962 when the LMB moved into a new building on Hills Road in Cambridge. At the time of its occupancy, only Fred Sanger had won a Nobel Prize. Since that time, twelve additional Nobel prizes (several shared) were awarded to scientists whose primary work was conducted at the LMB. Other Nobel Laureates were residents of the LMB during their careers, but their seminal work was conducted elsewhere. This presentation will take a look at this remarkable laboratory.

HIST 5 150 years of organic structures

David E. Lewis, Department of Chemistry, University of Wisconsin - Eau Claire, Eau Claire, WI 54702, Fax: 715-836-4979

In 1858, a pair of papers were published that were to change the way that organic chemists thought about the compounds they dealt with. The first to appear was a paper by Friedrich August Kekulé (Kekulé, A. "Ueber die Constitution und die Metamorphosen der chemischen Verbindungen und über die chemische Natur des Kohlenstoffs," *Ann. Chem. Pharm.* ,**1858**, *106*, 129-159), and the second, which appeared only slightly afterward, was by a brilliant young Scotsman, Archibald Scott Couper (Couper, A.S. "Sur une nouvelle théorie chimique," *Ann. chim. phys.*, **1858**, *53*, 469-489). Couper's paper had been delayed in appearing because his mentor, Charles Adolph Wurtz was not a member of the Académie des Sciences. Both theories were re-worked into a much more usable form by Aleksandr Mikhailovich Butlerov, who used the theory not only to rationalize the chemistry of known compounds, but to predict the existence of new compounds. Unlike modern structural theory, none of the principals involved thought of the structures as having a physical meaning, but, instead, made a clear distinction between the *chemical* structure of the compound, which could be deduced from its bonding affinities, and its *physical* structure, which could not.

HIST 6 Boettger's eureka! : New insights into the European rediscovery of porcelain

Nicholas Zumbulyadis, Independent Scholar (retired, Eastman Kodak Research Laboratories), 2 Seneca Parkway, Rochester, NY 14613

The alchemist Johann Friedrich Boettger is credited with the rediscovery of porcelain. While historians of chemical technology often focus on Boettger's tumultuous life, the circumstances of his discovery remain shrouded in mystery. Boettger's laboratory notes dated January 15, 1708 are considered as describing his first successful attempt. These experiments are characteristic of an optimization study, suggesting an earlier identification of the key ingredients. In his 1824 “History of the Staffordshire Potteries” Simeon Shaw dates Boettger's discovery a year earlier during his incarceration in Koenigstein. Shaw suggests the discovery was accidental as the “intense heat rendered the crucibles themselves of similar appearance to porcelain”. Shaw's conjecture was considered uncorroborated and was ignored. In this talk we will demonstrate that recently published analytical studies of crucibles similar to Boetger's, together with a fresh reading of archival material from the Dresden Porcelain Collection (transcript, Steinbrueck Report of 1717) lend strong credence to Shaw's conjecture of how Boettger rediscovered porcelain

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HIST 7 How G.N. Lewis and Theodore Richards missed the third law of thermodynamics

Patrick Coffey, Office for History of Science and Technology, University of California, Berkeley, 1628 Euclid Ave., Berkeley, CA 94709

At the close of the 19th century, it had become clear that the determination of the free energy of chemical reactions was the key to understanding chemical affinity. Yet the available methods for obtaining free energies were unreliable and of limited applicability, and there was no known method for determination of

free energies from thermal measurements. Walther Nernst's 1906 heat theorem, which later became known as the third law of thermodynamics, would prove to be the key to thermometric determination of free energies. Gilbert Newton Lewis, a 24-year-old graduate student at Harvard, had attacked the problem in his 1899 doctoral dissertation. His equation for thermal determination of free energies included an integration constant whose value he could not determine. Three years later, his dissertation adviser, Theodore Richards, published a paper that included data that Lewis later said "very nearly imply the generalizations which were later to be embodied in the third law of thermodynamics.” In 1902, Lewis had the equation and Richards had the data, but the two were no longer communicating--they had fallen out over a priority dispute.

HIST 8 Overcoming adversity: Triumph and tragedy in the life and career of Lawrence Knox, black American chemist

Leon Gortler, lgortler@brooklyn.cuny.edu, Brooklyn College, Department of Chemistry, 2900 Bedford Avenue, Brooklyn, NY 11210-2889, and Stephen J Weininger, stevejw@wpi.edu, Department of Chemistry & Biochemistry, Worcester Polytechnic Institute, Worcester, MA 01609-2280

Lawrence Knox was born in 1906 in New Bedford, MA where his grandfather had settled after buying his freedom from slavery. He graduated from Bates College in 1928 and for the next seventeen years he taught chemistry at several Black colleges in the South. During this period, he also earned a Master's Degree from Stanford University and a Ph.D. from Harvard. His doctoral research with Paul Bartlett is still cited in textbooks, and is one of the foundation pieces of organic reaction theory. From 1948 to 1958 he served as Director of the Laboratory for the Hickrill Chemical Foundation, during which time he published the synthesis of tropolone and tropylium bromide and carried out pioneering work on carbenes. In the late 1950s he emigrated to Mexico to work for Syntex where he published nine papers in steroid chemistry before his untimely death in 1966. Despite the triumphs, Knox's choices were shadowed by racial prejudice throughout his career.

HIST 9 History of high output experimentation in chemistry

Josef G. Schroer III, Chemspeed Technologies, 7 Deer Park Drive, Suite L, Monmouth Junction, NJ 08852, Fax: 732 329 1226

The field of high-output experimentation recently has emerged as a promising technology to accelerate research in biotechnology, pharmaceutical industry as well as in the chemical industry and materials science. Contrary to its view as modern topic, the first examples date back more then a hundred years; the first scientist to apply parallel methods was Thomas A. Edison. In his efforts to find a suitable filament for electric bulbs, he tested more then 1600 different materials before finding carbonized cotton threads as the material of choice. His scientific work is written down in more than 3000 notebooks with 280 pages each and provided results for almost 2500 granted patents. In 1912 the Italian chemist Giacomo Ciamician placed hundreds of reaction flasks on the roof of the University of Bologna in search of a photoactive substance for a photochemical process. A contemporary catalogue supplying chemical laboratory equipment among parallel extractors and shakers even offered an autoclave suitable for twelve parallel pressurized reactions with up to 10 bar. Almost one hundred years later the very same principle is still applied in state-of-the-art equipment for parallel reaction screening under elevated pressure (e.g. Symyx HiP reactor and Chemspeed Parallel Pressure Reactors). Today, every step of a specific workflow starting from solid & liquid handling, reaction & formulation control, purification, analysis and finally screening can be automated with suitable robotic equipment. Different application examples of such automation equipment in synthesis and formulation of materials are being described in this presentation.

HIST 10 Setting the record straight: HIST archives

James J. Bohning, Department of Chemistry, Lehigh University, 6 E. Packer Ave, Bethlehem, PA 18015, Fax: 610-758-6536

Although historians traditionally have a vested interest in preserving archives, the ACS History of Chemistry Division until relatively recently had not put its own house in order. Almost 20 years ago HIST chairman James Traynham appointed a divisional historian with a blanket charge to see to the history of the division. Since that time some records have been preserved, some have been lost, and none had been organized until 2007, when the division donated its records to the Chemical Heritage Foundation. With a grant from the ACS Divisional Activities Committee and a private donor, the HIST historian/archivist began the often tedious but always enlightening process of transferring the contents of rag-tag boxes and deteriorating file folders into a coherent collection properly preserved in archival containers. A brief history of the process will be followed by examples of what can be found in the HIST archives.

HIST 11 F.H. Thorp's *Outlines of Industrial Chemistry*

Gary D. Patterson, Department of Chemistry, Carnegie Mellon University, 4400 Fifth Avenue, Pittsburgh, PA 15213, Fax: 412-268-6897

Industrial chemistry has existed for millennia. Artisans have discovered specific recipes for the production of chemicals useful to humankind. Mostly, these recipes have either been kept as trade secrets or were merely collated as isolated artifacts. The perspective of *Outlines of Industrial Chemistry* by Frank Hall Thorp is that there are general principles that help to bring a more global character to the study of the practice of actual chemical manufacture. Thorp was inspired by the work of Lewis Mills Norton of MIT and followed him as Professor of Industrial Chemistry. There are many mechanical and thermal processes that are common to industrial practice. A thorough understanding of the operations of chemical manufacture provides a sound basis for the detailed consideration of specific substances. The total picture is presented from raw materials to primary product and important side products. Inorganic materials, organic materials and metals are treated in the context of actual industrial practice. The synoptic perspective developed in this landmark book became the hallmark of the emerging field of chemical engineering.

HIST 12 George E. Davis: A voice crying in the Midlands

Mary Ellen Bowden, Chemical Heritage Foundation, 315 Chestnut St, Philadelphia, PA 19106

Englishman George E. Davis is generally credited with initiating the concept of chemical engineering. After at least twenty years in the chemical industry, in 1887 Davis gave a series of twelve lectures at the Manchester School of Technology, which formed the basis of his *Handbook of Chemical Engineering* (1901)—really a textbook and the first of its kind. There were already industrial chemistry books written for each chemical industry, but Davis organized his text by the basic operations common to many industries—later to be called “unit operations” by the American Arthur D. Little. The context in which Davis operated may help explain why his ideas found a more receptive audience in the United States than in England.

HIST 13 *Principles of Chemical Engineering* by William H. Walker, Warren K. Lewis, and William H. McAdams

Ron Reynolds, Chemical Heritage Foundation, 315 Chestnut Street, Philadelphia, PA 19106

The term Unit Operations was first coined by Arthur D. Little in 1915. The concept rapidly became an organizing principle to teach Chemical Engineering at an expanding number of university departments. The first edition appeared in 1923. Earlier texts had been organized by industry and were heavily oriented towards describing equipment used in the various industries. This text defined general or common physical operations that could then be considered the building blocks to design processes for a wide variety of applications. Each operation was linked to its underlying scientific principles. Later editions in 1927 and particularly 1937 addressed chemical transformations via chapters on reaction equilibria and reaction kinetics. After this landmark text, many authors developed books to address each unit operation in greater detail. The presentation also discusses evolving quantitative methods for equipment design in chemical engineering's early decades.

HIST 14 *Transport Phenomena*: Success story in perspective

Barry L. Tarmy, 21 Water Lane, Berkeley Heights, NJ 07922, Fax: 801-729-6134

Bird, Stuart and Lightfoot's demonstratively successful *Transport Phenomena* was considered with some reservation a shift in chemical engineering thought and practice. In hindsight, its introduction in the late 1950's was optimal, having arrived midway between the introduction of the “Unit Operations” approach to chemical processing in the early 1900's and the coupling of chemistry and physics with engineering's technology and practices in the late 1900's and early 2000's. In addition to presenting some background on the authors, this presentation discusses chemical engineering's evolution from its “Unit Operations” processing base to the addition of the transport phenomena emphasis and then to more descriptive modeling and simulation of systems ranging in size from the industrial down to the micro-scale. With these advances has come increasing roles for chemical engineering in handling society's concerns with energy, health and the environment.

HIST 15 Perry's heavyweight handbook for chemical engineers

D. H. Michael Bowen, 8609 Ewing Drive, Bethesda, MD 20817

The discipline and profession of chemical engineering had already been going concerns for more than 30 years when the McGraw-Hill Book Co. published in 1934 the first edition of what was to become one of its all-time blockbuster sellers: *Chemical Engineers Handbook*. Written by a bevy of top engineers, most of them industrial, and edited initially by John H. Perry and later by his son Robert H. Perry and Cecil H. Chilton, the handbook became a “must have” reference tool for chemical and mechanical engineers. Edited by Don W. Green and currently in its 8th edition, it defies the increasing specialization of technology by covering its subject “from soup to nuts.” Who in 2008 wants or needs all this knowledge is another matter. The author will cover this amazing book and its long history from a personal perspective.

HIST 16 My name is not Kirk Othmer: Brooklyn Poly, Interscience, and the *Encyclopedia of Chemical Technology*

James J. Bohning, Department of Chemistry, Lehigh University, 6 E. Packer Ave, Bethlehem, PA 18015, Fax: 610-758-6536

Conceived by Donald Othmer and Raymond Kirk during World War II as a replacement for the *German Enzyklopädie der Technischen Chemie* first published by Fritz Ullman in 1914, the *Enyclopedia of Chemical Technology* did not appear until 1947 with the first volume, *A to Anthrimides*. As Othmer explained, “We really looked at it as more of a total public service to our profession than an occupation for any kind of gain.” Sixty years later, the “Kirk-Othmer,” (as it is often called and is now part of the title), is in its fifth print edition of 27 volumes and is available on-line where updates are made on a regular basis. As one reviewer proclaimed, “No library claiming to be a useful resource for chemical engineering professionals should be without it.”

HIST 17 *The Process Engineers Pocket Handbook* and other guides

Frankie Wood-Black, Trihydro Corporation, 6855 Lake Road, Ponca City, OK 74604

What does it mean to be a classic? For some it is one that every one in a specific discipline has some connection with, a link or shared memory. For others, it means that is the book that one can take off the shelf and refer to over and over again throughout their careers. This paper will focus on the second type, and provide a look at *The Process Engineer's Pocket Handbook* and other "Rules of Thumb" edited by C.R. Branan.

HIST 18 Four centuries of atomic theory: An overview

William B. Jensen, Department of Chemistry, University of Cincinnati, ML 0172, Cincinnati, OH 45221

The talk will give an overview account of atomic theory from the 17th century through the 20th century. It will show how the atomic parameters of importance have shifted from century to century and will summarize how each version of the theory impacted on the science of chemistry. The speaker will also give a brief bibliographic overview of the most important historical studies for each century.

HIST 19 Atomic theory before Dalton

Leopold May, Department of Chemistry, The Catholic University of America, Washington, DC 20064

In ancient times, the notion of small particles or atoms making up matter was conceived by philosophers first in Hindu India and then in the Mediterranean region. Kanada developed an atomic theory in India where five elements were known, air, water, earth, earth, and space. Democritus and Leucippus are considered to be the founders of the atomism theory in the fifth century B.C.E. although Sanchuniathon of Sidon is said to have originated the ancient opinions about atoms. Aristotle did not accept the atomic theory but did accept the four elements, air, water, earth, and earth. It remained with few modifications during the alchemical period that ended at the end of the eighteenth century.

HIST 20 Epistemic status of Dalton's atomic theory
Alan J. Rocke, Department of History, Case Western Reserve University, Cleveland, OH 44106
A philosopher of science has recently argued that "Dalton's chemistry did not open up an experimental programme over and above what could be pursued by tracing the consequences of the laws of proportion themselves and ignoring atoms," an assertion which mirrors that of Dalton's great contemporary and rival, Humphry Davy. This paper will attempt to refute these views, arguing that Dalton's theory, though certainly unfinished in many respects, was the earliest successful (epistemically robust) entry by any scientist -- chemist or physicist -- into the invisible world of atoms and molecules.

HIST 21 Atomic debates revisited
William H. Brock, Department of History, University of Leicester, Leicester LE1 7RH, United Kingdom
Triggered by Benjamin Collins Brodie's extraordinary "Calculus of Chemical Operations" in 1866, the following decade witnessed a number of highly-charged debates about whether chemists should believe in the atomic-molecular theory. Although largely resolved by the complexity of Brodie's system and by its failure to explain stereochemistry, debate was renewed by Ostwald's development of energetics in the 1890s. If energy, not matter, was primary, what need of atoms and molecules when chemical phenomena were sufficiently explained and predicted by energy exchanges? Many chemists, like Ramsay, were nearly persuaded until, in 1906, Perrin rendered scepticism of interest only to historians.

HIST 22 Atoms are divisible: The pieces have pieces
Carmen J. Giunta, Department of Chemistry and Physics, Le Moyne College, 1419 Salt Springs Rd, Syracuse, NY 13214-1399, Fax: 315-445-4540
This presentation will review some of the evidence for the divisibility and impermanence of atoms accumulated in the late 19th and early 20th centuries. When J. J. Thomson characterized cathode rays in 1897 as light, negatively charged "corpuscles," he proposed that they were a universal constituent of atoms. The discovery of radioactivity by Henri Becquerel in 1896 opened lines of inquiry quickly developed by Marie Curie and Ernest Rutherford among others. Within a decade, it was apparent that some atoms lost pieces spontaneously, turning into smaller atoms. Within a few more years came evidence that most of the atom's mass was concentrated in a minuscule volume. In retrospect, these researchers provided strong evidence that matter is ultimately discrete and particulate, but that atoms are not the ultimate particles.

HIST 23 Eyes to see: Physical evidence for atoms
Gary D. Patterson, Department of Chemistry, Carnegie Mellon University, 4400 Fifth Avenue, Pittsburgh, PA 15213, Fax: 412-268-6897
While Dalton inferred that the world of chemistry could be rationalized in terms of microscopic entities called chemical atoms, no one had ever "seen" an atom and the spirit of positivism denigrated their physical existence. One route to the visualization of atoms was Rayleigh scattering, and the discovery of monatomic argon by Rayleigh led to one of the most remarkable insights by Perrin: the heat capacity of argon was consistent with most of the mass concentrated in a small volume relative to the atomic volume determined from the equation of state for argon. In addition to the experimental data, the route to enlightenment also required the "eyes" of statistical thermodynamics and kinetic theory. Further light was shone on the nature of chemical atoms by the fluorescence obtained from gas discharge tubes of monatomic gases. The incredibly complicated spectra were reduced to a rational system of energy levels within the chemical atoms. The history of the interpretation of atomic spectra is more complicated and more interesting than is often portrayed, and is more continuous and less progressive than standard stories. Solid "facts" often faded

in view of the latest speculations, and “orthodox” interpretations denigrated empirically equivalent models. In a subject as complicated as the physics of atoms, the inherent underdetermination of science is well illustrated. The work of Brillouin will be examined in this light.

HIST 24 Atomic travelogue: Virtual tour of atomism

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The authors take the audience on a virtual tour, in the genre of their "Rediscovery" lecture series, of the sites associated with the growth of atomism. In this tour, the following locations are visited: Manchester (J. Dalton and E. Rutherford), Arcueil (C. L. Berthollet, J. L.Gay-Lussac, P. L. Dulong, and A.-T. Petit), Stockholm (J. J. Berzelius), Paris (J. B. A. Dumas and M. and P. Curie), Copenhagen (N. Bohr), Terling (Lord Rayleigh), Berlin (M. Klaproth and O. Hahn), Oxford (H. Moseley), St. Petersburg (D. Mendeleev), Karlsruhe (L. Meyer and S. Cannizzaro), London (W. Ramsay), Glasgow and Aberdeen (F. Soddy), Heidelberg (R. Bunsen and G. Kirchhoff), Montreal (E. Rutherford), and Munich (the Deutsches Museum).

HIST 25 Teaching the atomic theory: A visual-historical approach

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Starting with a brief historical development of chemistry, the atomic theory is taught in the classroom through a historical approach with a series of demonstrations and visuals including atomic symbols, cathode ray tubes, atom models, radioactivity, and spectra. It is this author's belief that students' understanding needs to include the evolution of the atomic theory (or any theory) as the result of many individuals making contributions over many years.

HIST 26 August Horstmann and the origins of chemical thermodynamics

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If asked to identify the founder of chemical thermodynamics most chemists would probably invoke the American physicist Josiah Willard Gibbs. But, in fact, the first application of the second law of thermodynamics to the study of chemical equilibrium was made by the German chemist, August Horstmann, in 1873. The talk will summarize Horstmann's life, his work on chemical thermodynamics, and its relationship to the so-called Heidelberg school of physical chemistry, which predated the better known school of Ostwald, van't Hoff and Arrhenius by several decades.

HIST 27 Kinetic and thermodynamic magnitudes as quantitative measures of chemical reactivity: Chemistry or physics?

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Chemists intent on quantifying chemical reactivity, or affinity, in the later 19th century drew heavily on contemporary physics, with mixed results. One strategy relied on thermodynamics. After an abortive attempt to formulate a thermochemical theory based only on the first law, chemists eventually adopted equilibrium constants and maximum work derived from the second law. A pioneer was van't Hoff, who noted that no commitment to the nature of affinity was necessary. Those desiring a more *Anschaulich* approach argued instead for rate constants, which owed much theoretically to the kinetic theory of gases. Since affinity was conceived as a force, it proved impossible to connect it to characteristic chemical phenomena, such as elective reactivity.

HIST 28 J. R. Partington (1886-1965): Physical chemistry in deed and word

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Today Partington is remembered as an historian of chemistry rather than as the significant British research chemist he was perceived to be in the 1920s and 1930s. The paper examines some of his prolific research output in physical chemistry, notably in the fields of specific heats and electrochemistry, and reviews his

reputation as a teacher, textbook writer and acerbic critic. A pupil of Lapworth in Manchester and of Nernst in Berlin, his *Higher Mathematics for Chemical Students* (1911), *Thermodynamics* (1913), *Specific Heats of Gases* (1924), and the huge *Advanced Physical Chemistry* (1949-54) are monuments to the development of physical chemistry since the 1850s.

HIST 29 Patrolling the border between physics and chemistry

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The attitude of chemists to physics has not been easy. Newton's wish to see chemistry reduced to physics was unacceptable to chemists, who saw it as an autonomous science. It was the autonomous school that prevailed in the nineteenth century. Chemistry became the science of particular substances while physics was that of the generality of the material world. Some chemists straddled the border but never created the discipline of physical chemistry. It was Ostwald who saw the need for a theoretical approach and turned it into physical chemistry. This idea was resisted by the dominant organic chemists and was not welcome until well into the twentieth century. The breakthrough came with quantum theory, which marked the return of reductionism. But there was a price to play. So many physical methods were found to be useful that physical chemistry lost its coherence; today this loss is affecting all chemistry.