THE OCTAGON

Volume 86, No. 6, September 2003 Lehigh Valley Section of the American Chemical Society

In This Issue:

766th LVACS Meeting:

Date: Wednesday, September 24
Location: Muhlenberg College
Event: Student Poster Session
Reception:5:00pm, Hoffman House. N 23rd Street
Dinner: 6:00pm, Hoffman House
Meeting: 7:15 pm Trumbower 130 lecture hall
Talk: 7:30pm Trumbower 130 lecture hall
Menu: Fluer-de-Lise Chicken Alfredo, Chinese Five-Spice Steak with noodles, or Vegetarian.
Cost: Cost: $20.00, students $10.00
Contact: Please call LuAnn Feist at 484-664-3260 or email feist@muhlenberg.edu by noon Sept 19th. Please give your name, affiliation, and choice of dinner entree.
Directions: Hoffman House is ½ block from the intersection of Chew and N. 23rd streets. Trumbower hall is centrally located on campus facing Chew street next to Haas College Center. Please see:
www.muhlenberg.edu/muhlinfo/directions.html
Speaker: Dr. Neil Marsh
Neil Marsh received his Bachelor's degree in Chemistry from the University of Cambridge, and his Ph.D. in Biochemistry, also from Cambridge. He spent time as a Postdoctoral fellow in the Chemistry Department at Johns Hopkins University, Baltimore, and was subsequently awarded a Research Fellowship from the Royal Society that he held in the Biochemistry Department, University of Cambridge. Since 1995 he has been on the faculty of the Chemistry Department at the University of Michigan where he is currently Associate Professor of Chemistry.
Talk: The good news about free radicals: how, and why, enzymes make radicals
Abstract: Our major interest is in enzymes that use free radicals (a carbon with an unpaired electron) to catalyze a variety of unusual reactions, many of which have no ready counterpart in organic chemistry. Normally, organic radicals are thought of as highly reactive species that are dangerous to biological systems. However, enzymes can profoundly alter the reactivity of free radicals so that a radical with a lifetime of microseconds in free solution may be stable for days when generated within a protein! Enzymes are therefore able to exploit free radicals as "sparks" with which to ignite reactions on otherwise un-reactive substrate molecules.

We are studying a class of enzymes that use the cobalt-containing organo-metallic coenzyme B12 to generate free radicals. These enzymes provide excellent model systems with which to study free radical catalysis. We are using a variety of kinetic and spectroscopic techniques, together with site-specific mutagenesis to understand how the enzymes generate and control reactive organic radical species.

2003-2004 Meeting Schedule

October 16- Lehigh University
November 19 - East Stroudsburg University
January - Albright College
February - Kutztown University
March - DeSales University
April - Moravian College
May - Cedar Crest College

Editors Note: The September and October LVACS meetings are closely spaced. Unfortunately, given printing and mailing time, the October Octagon will arrive approximately one week before the meeting. I will make every effort to provide it as quickly as possible. Please check the website for meeting information in September. Information will be posted for the meeting on the web as soon as it is received.

May Meeting Minutes:

The 765th meeting of the LVACS was called to order by Chair Dr. Paul Bouis at 7:35 PM on Tuesday, May 13, 2003; Spouses' Night, at Cedar Crest College. Dr. Bouis welcomed all the attending spouses. Prior to the talk, John Freeman submitted a Treasurer's Report. The checking account balance was $7,291.44, the scholarship balance was $1552.87, and the ready assets were $29,720.78. John also announced the recipient of the LVACS Organic Chemistry Undergraduate Scholarship. The awardee is Ryan Evans, a Lafayette College sophomore biochemistry major. He received the $1000.00 scholarship and applause from the audience. Next, the March and April minutes were approved. Dr. Bouis also reminded everyone to send him comments on the revised by-laws. Completion date is September 2003.

The question of the month was "What father-son duo received separate Nobel Prizes for contributions to "duality"? Sir Joseph John Thomson received the Nobel Prize in 1906 *"in recognition of the great merits of his theoretical and experimental investigations on the conduction of electricity by gases"* and his son, Sir George Paget Thomson, won the Nobel Prize in Physics in 1937 (along with Clinton Joseph Davisson) "*for their experimental discovery of the diffraction of electrons by crystals"* See http://www.slac.stanford.edu/library/nobel/ for additional information and quotation references.

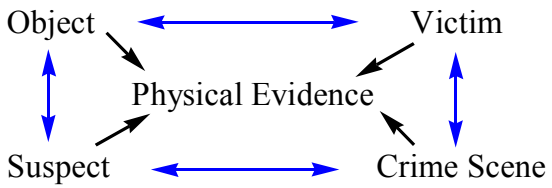
Dr. Roger Egolf gave a brief Councilor's Report from the March National meeting in New Orleans. Please see the September issue of the Octagon under separate heading for the report. Dr. Pam Kistler also noted the ACS will soon offer automobile insurance in addition to the standard insurance options. Please contact Roger or Pam with any questions.

Dr. Pam Kistler introduced the speaker for the evening, Dr. Lawrence Quarino. The title of Dr. Quarino's talk was "Could Horatio Caine and Catherine Willows Function in a Real Forensic Laboratory?" Dr. Quarino began his talk by showing the audience a number of the more popular media examples using forensic chemistry as rating attractors. Speculation on the rationale of the growing interest begins with the advances in DNA. Forensic science wasn't even a first or second option prior to the great advances in DNA technology.

Dr. Quarino described the various personnel involved in crime prevention/investigations, namely Policemen, District Attorneys, Medical Examiners, and Forensic Scientists (Criminalists). The main difference between the thought processes are "the question of Why?" The Forensic Scientist does not ask "Why," as incorrectly portrayed on popular media. A simple table illustrates the difference:

Question Asked	By Whom
Who?	Police, District Attorneys, Criminalists
Why?	Police, District Attorneys
How?	Police, District Attorneys, Medical Examiners, and to a small extent, Criminalists

Dr. Quarino also clarified that a Criminalist is a Forensic Scientist while a Forensic Scientist is not always a Criminalist. Some examples of the latter are Forensic- Engineers, Toxicologists, Medical Examiners, Anthropologists, Odontologists, Document Examiners, etc. Overall, these persons must use the scientific method; i.e. disprove a hypothesis. The initial step is to look at the evidence. There are three main types of evidence. One is trace, as in chemical analysis of fibers, hairs, glass, etc. Another is biological evidence, such as blood, semen, saliva, etc. Lastly, there is pattern evidence, such as fingerprints, footwear impressions, bloodstain patterns, etc. These pieces of physical evidence are the central key to any investigation, as Dr. Quarino showed in a similar diagram:



There are also linkages to be made between suspects, leads, any disproving or supporting information, and the reconstruction process.

Dr. Quarino compared the popular media's portrayal of crime investigations and the forensic scientists' involvement to reality.

Popular Media, Forensic Scientists. . .	Reality
Interrogates	Never Interrogates
Makes judgments about guilt or innocence	Judgments compromise scientific method
Operates independently	Accompanies Police
Have multiple expertise	Has one in-depth expertise
Act like detectives	Report observable and quantifiable data
Receives DNA results within an hour	Receives DNA results within a week minimum

To dispel many of the myths, Dr. Quarino described the process from crime scene to court.

1. Crime occurs – jurisprudence and the law are the controlling guidelines to determine who perpetrated the crime.
2. Evidence is collected based upon the Fourth Amendment (protections against unreasonable searches and seizures).
3. Chain of custody is established, to ensure an adequate paper trail exists.

a. Identify the object

b. Maintain the condition of the evidence as collected

Bullet point 3.b involves a whole host of activities and regulatory organizations. In order to have reliable scientific evidence, appropriate quality assurance programs must be in place. These programs requires laboratory accreditation (ASCLD/LAB), proper application of technologies, and documented evidence of compliance and qualified personnel.

4. Pre-trial Discovery - The specific tools of pre-trial discovery include interrogatories, depositions and requests for documents.
5. Preservation of Evidence

Dr. Quarino next described how scientific evidence was brought to light, and into a courtroom; the Frye decision of 1923 (see http://www.law.harvard.edu/publications/evidenceiii/cases/frye.htm for some additional detail). Subsequently, in 1993, Rule 702 superseded Frye. Rule 702 is briefly reiterated below (reference to http://www.touchngo.com/ lglcntr/ctrules/evcom/EVC-52.htm):

Rule 702. Testimony by Experts.

Common law courts traditionally have permitted expert testimony on subjects "beyond the lay comprehension." This rule continues the tradition with two modifications: 1) Rule 702 permits expert testimony if it would be helpful to the trier of fact in understanding evidence that is difficult, but perhaps not beyond ordinary comprehension. 2) The rule provides that an expert may provide background information to a jury without offering an opinion on any issue in the case.

By allowing testimony "in the form of an opinion or otherwise," the rule allows an expert to give testimony in the form of a dissertation on a given topic thereby allowing the trier of fact to draw his own inferences by applying the specialized knowledge to the facts of the case at hand. Since this approach avoids complaints that the expert is usurping the function of the jury, it should be welcome in many courtrooms. Indeed, it is difficult to understand why some common law authorities are reluctant to use expert evidence in this manner. If the rationale were that the trier of fact might have difficulty in drawing inferences from specialized evidence, it would not be persuasive, because it would suggest that the trier of fact is incapable of rejecting expert opinions. If expert evidence is to assist the trier of fact, the trier must always understand how the expert evidence is derived. This provision is identical to Federal Rule 702 which was broadly written to encompass fields of expertise that require "specialized" knowledge. In addition to witnesses skilled in scientific and technical matters, this rule recognizes that witnesses qualified by "knowledge, skill, experience, training, or education" in areas such as banking or even real estate values are similarly capable of aiding the trier of fact.

Dr. Quarino preceded this by going through a number of episodes of CSI, explaining how, if set in a real world environment, the manner in which the personnel conducted themselves would not prove satisfactory in a courtroom. He also noted that most of his students do not truly realize the level of tedium associated with forensic work. In addition, many students want to make judgments, and ask “why”, rather than develop and report the observable and quantifiable data required.

Dr. Quarino entertained numerous questions. Dr. Bouis presented Dr. Quarino with a gift of the section's appreciation. The meeting was adjourned at approximately 8:40 PM.

Respectfully Submitted,
Tara S. Baney
Secretary, LVACS, 28-May-2003

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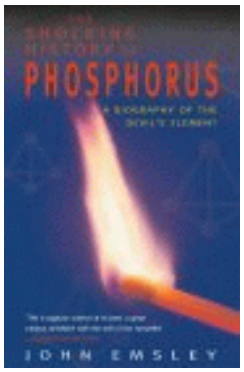
Regional Meetings All Over THE MAP!

This fall, 5 ACS regional meetings will take place from coast to coast. The Western region opens the season October 15 – 18 in beautiful Long Beach, California. Pittsburgh, Pennsylvania is the setting for the Central meeting October 19 - 22, which takes place during National Chemistry Week. Southwest's meeting, October 25 – 28, will be in Oklahoma City, Oklahoma; and Midwest in Columbia, Missouri November 5 – 7. The season closes November 16 – 19 in Atlanta, Georgia, at the Southeast regional meeting.

For more information on the meeting, submitting an abstract, or registering, please visit the ACS Regional Meetings web page at www.acs.org/meetings/regional. Don't miss out on this exciting opportunity to network and share information vital to your professional growth.

Book Review: **The Shocking History of Phosphorus**, by John Emsley
Cambridge University Press



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(Review obtained and reprinted with permission from the naked scientist http://www.thenakedscientist.com/)

"The autopsy of a person who had died from phosphorus poisoning would reveal inflammation a haemorrhage in the stomach and bowel, the liver would show fatty changes and both it, and the kidneys would be enlarged, greasy and of a yellow colour. But the most convincing proof of death due to phosphorus exposure would be to turn off all the lights in the mortuary and see its tell-tale glow..."

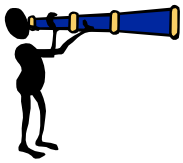
What connects the match industry, nerve gas, spontaneous human combustion, DNA, Gulf war syndrome, coca-cola, sheep dip and fertiliser? The answer lies in award-winning author John Emsley's new book The Shocking History of Phosphorus, a triumph of accessible science writing dedicated to the devil's element !

Starting with the early alchemists, who in their quest for gold boiled up urine and instead found phosphorus, John Emsley, Cambridge University's Science writer in residence, traces the chequered history of the element that has made and lost fortunes, been used to wage war, revolutionised the lives of Victorian housewives, spawned a trade union, and given rise to the phenomenon of Will-o'-the-wisp.

Beautifully embellished with nuggets of history and simple scientific explanations, The Shocking History of Phosphorus assumes no prior knowledge and will appeal to anyone of any age with a healthy interest in science and history.

I was genuinely sorry to finish this book !

(Dr. John Emsley, Cambridge University Science Writer in Residence, is a chemist with a gift for storytelling. He has previously won the Rhone-Poulenc prize for the best science book of the year, and both the Sony and Glaxo Awards for the version of The Shocking History of Phosphorus which he wrote for broadcast on BBC Radio.



Look For LVACS on the web at www.esu.edu/lvacs

This Month in Chemical History

By Harold Goldwhite, California State University, Los Angeles (hgoldwh@calstatela.edu)

Prepared for SCALACS, the Journal of the Southern California, Orange County, and San Gorgonio Sections of the American Chemical Society

On June 25, 1864 Hermann Walther Nernst was born in Briessen in what is now Poland but was then West Prussia. Nernst's is a name known even to students in a general chemistry course. They meet him at least twice during their introduction to chemistry: as the proponent of the eponymous equation that connects standard electrochemical cell potentials to potentials under non-standard conditions; and as the enunciation of the third law of thermodynamics proposing zero *entropy for perfect crystals at zero Kelvins. Two such fundamental* discoveries are certainly enough to establish fame among chemists, but Nernst did much more.

Nernst showed scientific promise from the beginning. At his gymnasium, where the curriculum included both classics and science, he became valedictorian. His university career, as was quite common in the 1880's, was peripatetic and included time at Zurich, Graz, Berlin, and, particularly Wurzburg, where he presented his initial dissertation before starting on doctoral work. The list of his instructors and colleagues reads like an honor roll of nineteenth century science and includes Weber, Helmholtz, Boltzmann, and Kohlrausch. A career in physical chemistry seemed almost pre-ordained and, despite the fact that Emil Fischer was a colleague at Wurzburg, that is the direction that Nernst took. He worked on his doctorate with Kohlrausch, best known for his work in electrochemistry. Another of Kohlrausch's collaborators was Arrhenius, still not honored in his native Sweden but regarded in Prussia as a promising new scientist. Arrhenius in turn introduced Nernst to another slightly more senior physical chemist, Ostwald. The omens were favorable, and after finishing his doctorate in 1887 Nernst joined Ostwald, who had just been appointed to a Chair of Physical Chemistry at Leipzig, as his assistant.

Nernst spent four productive years in Leipzig where he worked out the Nernst equation, derived a theory of diffusion of electrolytes in solution, explained the common-ion effect, and enunciated the solubility product principle. Not bad for four years as an assistant. Not surprisingly he was invited to Gottingen as an assistant professor. There he finished work on his textbook of Theoretical Chemistry, first published in 1893, and destined for fifteen editions over the next 35 years. Unlike his mentor Ostwald, a long-time skeptic about atomic theories, Nernst used the atomic and molecular approach consistently in his work and in his text, which was generally judged to be the best exposition of physical chemistry of its time. In 1894 he was appointed to the first Chair in Physical Chemistry at Gottingen. He built a substantial and successful research school there initially focusing on electrochemistry, but then moving to broader studies in thermodynamics including the effects of temperature changes on gas phase equilibria.

A move to the Chair in Berlin in 1905 continued the emphasis on thermodynamics and at then end of that year Nernst announced his heat theorem, now known as the third law of thermodynamics, bolstered by rather meager experimental evidence. The next ten years were spent in part assembling evidence for the correctness of his views. Nernst was not only a great theorist, he was also an excellent experimentalist. Along with his student Lindemann (later Lord Cherwell, one of Winston Churchill's scientific advisors during World wad II) he designed the calorimeters for obtaining very low temperature heat capacity data, built an improved hydrogen liquefier, and invented an infrared source consisting of a heated bar of zirconium and other metal oxides and known as the Nernst Glower.

During the first World War (1914-1918) Nernst acted as a good German patriot. He signed a notorious memorandum celebrating German militarism and repudiating the idea that Germany had started the war. He and his institute worked on improving armaments and on using non-lethal irritants like tear gas in chemical warfare. But Nernst was disturbed by the direction Germany took during the war and was not unhappy about the fall of the Kaiser. He returned to fundamental research and just two years after war's end was awarded the Nobel Prize in chemistry in 1920 for his fundamental work in thermodynamics. After a brief abortive attempt to head a national institute of physics and technology he returned to the university, but his glory years were behind him. When Hitler came to power in 1933, disturbed by the dismissal of Jewish colleagues and concerned about the status of two of his daughters who were married to Jews (both families emigrated in the 1930s), Nernst retired to Zibelle, near the German-Polish border. He died there in November1941.

Chemistry Question of the Month

What Nobel Prize winning Chemist entered the study of Chemistry because his father deemed him "too stupid to be a business man"? The family business was lumber.

Come to the September meeting for the answer.

Local ALMA Chapter Meets

Submitted by John Sadowski

The DE/NJ/PA Local Chapter of the Analytical Lab Managers (ALMA) recently met at the ATOFINA laboratories in King of Prussia, PA. The meeting featured presentations on managing knowledge in the laboratory and outsourcing analytical work. Scott Hanton of Air Products and Chemicals, Inc. reviewed new methods and formats that are being developed to aid in the management and sharing of valuable knowledge in an organization. Software tools to aid in the management of information was then discussed by Robert Walla of the Astrix Technology Group. Tony Nemzer of Alliance Technolgies, LLC discussed the importance of understanding the strengths and weaknesses of both the corporate and contract analytical laboratory. He encouraged attendees to identify the high value-added services that the internal lab should focus on and those that the internal lab can no longer justify continuing to do in-house. The latter are candidates for outsourcing. Dick Freelander of Cerexagri discussed a decision format based on both cultural and business strategy elements to determine what analytical work can be outsourced and what should be retained inside. Following the presentations and discussions the group toured the ATOFINA analytical laboratories.

ALMA is an international organization of analytical managers. The mission of ALMA is to share and disseminate information about the management of analytical services and instrumentation laboratories. The unique strength of ALMA lies in providing a forum for analytical managers and leaders to network, learn from each other and share common problems and ideas that have worked and not worked. Find out more about ALMA at www.labmanager.org or contact John Sadowski of Air Products at sadowsjs@apci.com to participate in the next meeting of the local ALMA chapter. The next meeting at a site to be determined will feature presentations on Motivating Personnel and Benchmarking Price and Cost Structures.

Editors Note: My apologies to ALMA as this report was mistakenly excluded from the May Octagon - Sorry!

Undergraduate Education News:

New Chemistry Education Minor

In the new edition of the ACS guidelines for ACS-approved programs a new chemistry education minor was introduced, as were revised requirements for the chemistry education option. The new guidelines and application forms for the minor and the chemistry education option are now available from the Office of Professional Training by calling 202-872-4589 or emailing cpt@acs.org.

Certificates for Undergraduates

The ACS Committee on Professional Training (CPT), among many other activities in post secondary education, administers the ACS approval process for undergraduate programs in chemistry. All graduates of an ACS-approved program who have completed the requirements for certification described in the ACS guidelines are certified annually to the Society by each program chair. Every certified graduate is eligible to receive a certificate from ACS that recognizes that the graduate has completed a bachelor's degree that meets the Society's criteria for professional education and membership. Faculty members and graduates can request certificates from the Office of Professional Training by sending an email to cpt@acs.org. Upon certification, every graduate is eligible for full membership in the ACS by applying online at www.chemistry.org/membership or by contacting Hilary Baar (h_baar@acs.org) in the ACS Membership Activities Office.

Join the Celebration!
National Chemistry Week
October 19-25, 2003!

Theme: "Earth's Atmosphere and Beyond!"

The unifying event for this year's National Chemistry Week celebration will be "Honoring Innovators and Pioneers in Aviation and Atmospheric Chemistry." Local Sections are asked to recognize local individuals that have made important contributions to the advancement of aviation and atmospheric chemistry with Salutes to Excellence presentations. The Office of Community Activities will provide you with a complimentary plaque to present to your honoree(s).

Sections are also invited to participate in the national poster competition for K-12th grade students. The contest, "Earth's Atmosphere and Beyond!" encourages students to draw a poster illustrating contributions made by chemistry to the advancement of aviation and atmospheric chemistry. National winners will receive a handheld color TV, honorable mentions will be awarded a set of Talk-About 2-Way radios, and teachers of winning students will each receive a Periodic Table of the Elephants Poster.

For more information, visit the NCW website at chemistry.org/ncw or contact the ACS Office of Community Activities at 1-800-227-5558, ext. 6097.

Nobel Biography

Wilhelm Ostwald

Wilhelm Ostwald was born on September 2, 1853, in Riga, Latvia, as the son of master-cooper Gottfried Wilhelm Ostwald and Elisabith Leuckel.

He was educated at the "Real gymnasium" there and in 1872 was admitted to Dorpat University to read chemistry. After taking his final examinations three years later, he obtained the post of assistant at the Physics Institute under Professor Arthur von Oettingen, and subsequently took a similar position in the Chemistry Laboratory under Carl Schmidt. Ostwald himself declared that he was most indebted to these two teachers for his scientific training. In 1877 he was admitted as unpaid academic lecturer at Dorpat University, and this was followed (1881) by the appointment of full time Professor of Chemistry at the Polytechnicum in Riga. Six years later he accepted an invitation as Professor of Physical Chemistry at Leipzig University. Among his later famous pupils are Arrhenius (Nobel Prize 1903), Van 't Hoff (Nobel Prize 1901), Nernst (Nobel Prize 1920), Tammann and Wislicenus. Ostwald remained in Leipzig until he retired in 1906, with the short interruption for one term as first "Exchange Professor" at Harvard University, Cambridge (Mass.) in 1904-1905.

Ostwald started his experimental work in 1875, with an investigation on the law of mass action of water in relation to the problems of chemical affinity, with special emphasis on electrochemistry and chemical dynamics.

In consequence of his pioneering work especially in the field of electrochemistry, which also led to the discovery of the law of dilution named after him, his activities as a writer and his gift for organization, Ostwald became one of the founders of classical physical chemistry. He published numerous textbooks, starting with the Lehrbuch der Allgemeinen Chemie (Textbook of general chemistry) in 1884. This was followed by Grundriss der Allgemeinen Chemie (Outline of general chemistry) in 1889 and Hand- und Hilfsbuch zur Ausführung physikalisch-chemischer Messungen (Handbook and manual for physicochemical measurements) in 1893. Numerous other scientific works on analytical chemistry, electrochemistry, inorganic chemistry followed.

Ostwald also founded and edited the Zeitschrift für physikalische Chemie in 1887; Ostwald himself edited 100 volumes, up to 1922.

He was also in charge of the organization of the Department of Physical Chemistry at Leipzig University, and in 1894 he founded the "Deutsche Elektrochemische Gesellschaft" (German Electrochemical Society) which in 1902 expanded to become the "Deutsche Bunsen-Gesellschaft für angewandte physikalische Chemie" (German Bunsen-Society for Applied Physical Chemistry).

In 1909 Ostwald was awarded the Nobel Prize for Chemistry for his work on catalysis, chemical equilibria and reaction velocities. He received honorary doctorates from several universities in Germany, Great Britain and the USA, and was made an honorary member of learned societies in Germany, Sweden, Norway, the Netherlands, Russia, Great Britain and the USA. In 1899 he was made a "Geheimrat " by the King of Saxony.

After his retirement in 1906, Ostwald found a new sphere for his scientific and organizatorial talents. Besides continuing his studies and publication on philosophy, such as Der energetische Imperativ (The energetic imperative), Moderne Naturphilosophie (Modern natural philosophy), Die Pyramide der Wissenschaften (The pyramid of the sciences), he also took an active part in public life. He supported the middle-class pacifist movement, was interested in educational reforms and in monism. He believed that in view of his position he could decisively fight the Church's claim to power in the field of natural sciences and to spread a modern scientific ideology. This aim he pursued in his writings Monistische Sonntagspredigten (Monistic Sunday sermons) and Arbeiten zum Monismus (Works on monism).

In 1902 Ostwald founded Annalen der Naturphilosophie and edited 14 volumes up to 1921. He also founded Klassiker der exakten Wissenschaften in 1889, of which some 250 volumes have been published.

Right up to the end of his life Ostwald studied colours and shapes, in the endeavour to find a scientific standardization for colours. His main works in this field are Die Farbenfibel (The coulour primer), Die Farbenlehre (Colour theory), Die Harmonie der Farben (Harmony of the colours). He also published a periodical Die Farbe (Colour).

Ostwald was married to Helene von Reyher in 1880. They had two daughters and three sons, one of whom, Dr. Karl Wilhelm Wolfgang (known in the scientific literature as Wo. Ostwald), was Lecturer in the University of Leipzig, and Editor of the Zeitschrift für Chemie und Industrie der Kolloide, the forerunner of the Kolloid-Zeitschrift.

After an extremely active life, Ostwald died at his country home near Leipzig on April 3, 1932.

From Nobel Lectures, Chemistry 1901-1921, Elsevier Publishing Company, Amsterdam