

AMERICAN CHEMICAL SOCIETY

Division of Environmental Chemistry

Preprints of Extended Abstracts

Presented at the

223rd ACS National Meeting Orlando, FL

April 7-11, 2002 Vol. 42 No.1

- General Papers
 - ▶ T. Mill
- Analysis of Emerging Contaminants Using LC/MS/MS
 - ▶ E.M. Thurman and I. Ferrer
- Membrane Processes and Applications
 - ▶ S. Hong
- New Analytical Techniques for Dissolved Organic Matter
 - ▶ C. Rostad and C. Hwang
- The Science and Policy of Topical Antimicrobial Agents
 - ▶ E.T. Urbansky
- ACS Award for Creative Advances in Environmental Science and Technology:
Honoring Dr. Roger Atkinson (Sponsored by Air Products and Chemicals, Inc.)
 - ▶ R. Atkinson and R.A. Hathaway
- Mercury in the Environment: Assessing and Managing the Multimedia Risks
 - ▶ W.G. Stelz, T. Atkeson, A.M. Ford and J.G. Herrmann



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Allan M. Ford

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Theodore Mill

Secretary:
Larry LaFleur

Preprints of Extended Abstracts

Presented
at the
223rd ACS National Meeting

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Volume 42 No. 1

Division of Environmental Chemistry, Inc.
American Chemical Society

**Division of Environmental Chemistry
American Chemical Society**

The Division of Environmental Chemistry was established as a Division of the American Chemical Society in 1913, as the Division of Water, Sewage and Sanitation Chemistry. (The name was changed in 1959). The objectives of the Division are to promote research, disseminate information and improve education and public awareness regarding the chemistry of the environment, in all of its aspects. In addition, the Division provides assistance to the American Chemical Society and its committees and divisions in matters regarding the environment.

In fulfillment of the above objectives, the Division sponsors symposia at the two annual meetings of the American Chemical Society. These symposia are organized by volunteers from the Division under the guidance of the program chair. For information on upcoming symposia at national meetings or to volunteer to organize a symposia, contact the **Program Chair**:

Theodore Mill
Chemlab P 273
Stanford Research Institute
Menlo Park, CA 94025
650-859-3605

Extended abstracts of papers presented in symposia sponsored by the Division of Environmental Chemistry are published twice each year by the Division. These extended abstracts generally are two to four pages in length and contain data, figures and references. The extended abstracts appear in "Preprints of Extended Abstracts...", which are sent to all members of the Division as part of their benefits of membership. Copies of this volume and previous volumes are available from the **Publications Manager**:

Ruth A. Hathaway
1810 Georgia St.
Cape Girardeau, MO 63701-3816
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Membership in the Division of Environmental Chemistry is open to all members and National Affiliates of the American Chemical Society upon request to the Secretary of the Division and payment of dues. A person who is not a member or National Affiliate but wishes to participate in the activities of the Division may become a Division Affiliate provided that person is not a chemist or chemical engineer, resides in the United States and pays all dues. For information regarding membership in the Division or the American Chemical Society, contact the **Business Office**:

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573-334-3827

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EXECUTIVE COMMITTEE

The Executive Committee is the governing body for the Division of Environmental Chemistry. The committee regularly addresses programming for future National meetings, membership dues and benefits, finances and involvement of the Division in environmental activities of the American Chemical Society and related organizations. All members of the Division are encouraged to participate in the governance of the Division.

**The Executive Committee meeting will begin at 7:00 PM on
Sunday, April 7, 2002 in Room 208C of the Convention Center.
All Division members are invited to attend.**

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Division Web Site General

<http://acs-envchem.duq.edu/>

Division Web Site Program

<http://gemini.tntech.edu/~mjw5030/acspage.html>

**Division of Environmental Chemistry
Activities during the Orlando National Meeting**

Technical Sessions:

Symposia:	Sunday-Thursday
Division Poster Session/Social Hour:	Wednesday Evening, Convention Center, Hall C, 6:00-8:00 p.m.
ACS Sci-Mix	Monday Evening, Convention Center, Hall C, 8:00-10:00 p.m.

Division Business:

Long Range Planning Committee: The future of the Division is discussed and planned. Issues dealing with membership, finances and programs may be discussed. All members of the Division are welcome and encouraged to participate.	Sunday Afternoon, Convention Center, Room 208C 4:00-5:00 p.m.
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Program Planning Committee: Future symposia topics are considered and discussed. All members interested in participating in the technical session planning for the Division are encouraged to attend this meeting.	Sunday Afternoon, Convention Center, Room 208C 3:00-4:00 p.m.
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Executive Committee Meeting: Financial and program issues are addressed and decided in this meeting. All members of the Division are encouraged to attend.	Sunday Evening, Convention Center, Room 208C 7:00-10:00 p.m.
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Division Social Events:

Social Hour and Dinner: All members and their guests are invited. We select the restaurant for its quality and atmosphere. You will have the opportunity to meet with other Division members in a relaxing atmosphere.	Tuesday Evening, California Bar and Grill in the Florida Mall, 8001 S. Orange Blossom Trail (Sand Lake Road)
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Tickets must be purchased by Monday, April 8. Tickets can be purchased at the meeting registration area or at the Division Desk.

Social Hour:
6:30-7:30 p.m. (COD)

Dinner: 7:30 p.m.
\$50.00 per person

**Division of Environmental Chemistry
Activities during the Orlando National Meeting**

Event	Sun	Mon	Tues	Wed	Thurs
Long Range, Program Planning and Executive Committee Meetings					
Division Social Hour and Dinner (California Bar and Grill in the Florida Mall)					
ACS Sci-Mix					
Division Symposia					
Division Poster Session/Social Hour					
General Papers					
Analysis of Emerging Contaminants Using LC/MS/MS					
Membrane Processes and Applications					
New Analytical Techniques for Dissolved Organic Matter					
The Science and Policy of Topical Antimicrobial Agents					
ACS Award for Creative Advances in Environmental Science and Technology: Honoring Dr. Roger Atkinson (Sponsored by Air Products, Inc.)					
Mercury in the Environment: Assessing and Managing the Multimedia Risks					

For changes in times or events, please stop at the Division Information Desk, which will be located in the Convention Center, near the Division's Symposia, Room 203.

DIVISION OF ENVIRONMENTAL CHEMISTRY

Listed below are upcoming symposia scheduled for the Division of Environmental Chemistry at future National ACS meetings. If you are interested in presenting a paper at a symposium or assisting in symposia organization, please contact the appropriate symposium organizer listed below or the Program Chair: Theodore Mill, SRI, PS273, 333 Ravenswood Ave, Menlo Park, CA 94025; Phone 650-859-3605, Fax 650-859-4321, ted.mill@sri.com. Papers should be sent to the Environmental Division Office: Ruth A. Hathaway, 1810 Georgia St., Cape Girardeau, MO 63701-3816; Phone 573-334-3827, Fax 573-334-2551, hathaway_consulting@hotmail.com.

BOSTON, MA, AUGUST 18-22, 2002

"**Short**" abstracts of presentations are required. These abstracts must be submitted to the ACS Online Abstract Submittal System (OASys). For information and submittal go to www.acs.org/meetings/abstract/abinfo.html. The deadline for submittal is April 1, 2002. "**Extended**" abstracts of presentations are required by the Environmental Division. Extended abstracts must be submitted for the paper to be considered for presentation at the national meeting. The Extended Abstract Instructions are available at: <http://gemini.tntech.edu/~mjlw5030/acspage.html>. Either an electronic copy may be e-mailed as an attachment to the respective symposium organizer OR an original plus 2 copies of extended abstract may be sent to respective symposium organizers. Extended abstracts must be received by April 8, 2002. All general papers will be presented in the Division's poster session.

General Papers.

- T. Mill (see above)

Biogeochemistry of Organic Contaminants in Aquatic Ecosystems: In Honor of Professor James G. Quinn.

- T.L. Wade, Geochemical and Environmental Research Group, Texas A&M University, 833 Graham Road, College Station, TX 77845; 979-862-2323 ext 134; Fax (979)862-2361; terry@gerg.tamu.edu.
- J.W. Farrington, Clark Laboratory Room 223, MS #31, Woodshole Oceanographic Institution, 360 Woods Hole Road, Woods Hole, MA 02543-1541; 508-289-2200; Fax 508-457-2188; jfarrington@whoi.edu.

Chemistry of EPA Contaminant Candidate List Compounds

- M.L. Magnuson, National Risk Management Research Laboratory, Water Supply and Water Resources Division, U.S. Environmental Protection Agency, 26 West Martin Luther King Dr., Cincinnati, OH 45268; 513-569-7321; Fax 513-569-7658; magnuson.matthew@epa.gov.

Deactivation (Neutralization or Detoxification) and Safe Disposal of Germicides and Pesticides.

- P. Zhu, Biocides Research, Advanced Sterilization Products, 33 Technology Drive, Irvine, CA 92618; 949-789-3848; Fax 949-450-6850; pzhu1@aspus.jnj.com.
- C. Roberts, Advanced Sterilization Products, 33 Technology Drive, Irvine, CA 92618; 949-450-6349; Fax 949-450-6850; croberts@aspus.jnj.com.

Electrochemical Methods for Wastewater and Potable Water Treatment.

- J. Farrell, Dept. of Chemical and Environmental Engineering, University of Arizona, Tucson, AZ 85721-0011; 520-621-2465; farrell@enr.arizona.edu.

Environmental Analytical Chemistry in the Laboratory. (Cosponsored with the Division of Chemical Education)

- J.C. Schaumloffel, Department of Chemistry and Biochemistry, University of Massachusetts-Dartmouth, 285 Old Westport Road, North Dartmouth, MA 02747; 978-665-3419; Fax 978-665-3478; jschaumloffel@umassd.edu.

Environmental Chemistry Awards.

- T. Anderson, The Institute of Environmental and Human Health, Texas Tech University, Box 41163, Lubbock, TX 79409-1163, 806-885-4549 ext. 231, Fax 806-885-4577, tanderson@tiehh.ttu.edu.

Exploring the Relationships Between Organic Solvent Pollutants and Metals: Implications for Green Chemistry.

- A. Rihana-Abdallah, Dept. of Civil and Environmental Engineering, Univ. of Detroit Mercy, 4001 W. McNichols Road, P.O. Box 19900, Detroit, MI 48219-0900; (313)993-1041; Fax (313)993-1187; rihanaa@udmercy.edu.
- K.L. Skubal, Dept. of Civil Engineering, Case Western Reserve University, 216 Bingham Building, 10900 Euclid Avenue, Cleveland, OH 44106-7201; 216-368-6938; Fax 216-368-5229; kls26@po.cwru.edu.

Membrane Processes and Application.

- J.M. VanBriesen, Dept. of Civil & Environmental Engineering and Biomedical & Health Engineering, Carnegie Mellon University, Porter Hall 119, Pittsburgh, PA 15213; 412-268-4603; jeanne@cmu.edu.

Principals of Environmental Sampling and Analysis – Two Decades Later
(Copponsored with ACS Committee on Environmental Improvement).

- L. LaFleur, NCASI, PO Box 458, Corvallis, OR 97339; 541-752-8801; Fax: 541-752-8806; llafleur@ncasi.org.
- T. Jones, Jr., Tennessee Valley Authority, PO Box 188, Aberdeen Proving Grounds, MD 21010-0188; 410-436-7898; tjones@tva.gov.
- W.H. Batschelet, Air Force Center for Environmental Excellence, 3207 North Road, Brooks AFB, TX 78235-5363. 210-536-5658; Fax: 210-536-5989; william.batschelet@hqafcee.brooks.af.mil.

Tropospheric Chemistry.

- J.M. Andino, University of Florida, Dept. of Environmental Engineering Sciences, P.O. Box 116450, Gainesville, FL 32611-6450; 352-846-1744; Fax: 352-392-3076; andino@ufl.edu.

NEW ORLEANS, LA, MARCH 23-27, 2003

"**Short**" abstracts of presentations are required. These abstracts must be submitted to the ACS Online Abstract Submittal System (OASys). For information and submittal go to www.acs.org/meetings/abstract/abinfo.html. The deadline for submittal is November 20, 2002. "**Extended**" abstracts of presentations are required by the Environmental Division. Extended abstracts must be submitted for the paper to be considered for presentation at the national meeting. The Extended Abstract Instructions are available at: <http://gemini.tntech.edu/~mjlw5030/acspage.html>. Either an electronic copy may be e-mailed as an attachment to the respective symposium organizer OR an original plus 2 copies of extended abstract may be sent to respective symposium organizers. Extended abstracts must be received by November 27, 2002. All general papers will be presented in the Division's poster session.

General Papers.

- T. Mill (see above)

ACS Award for Creative Advances in Environmental Science and Technology

- R. Hathaway (see above)

NEW YORK CITY, NY, SEPTEMBER 7-11, 2003

"**Short**" abstracts of presentations are required. These abstracts must be submitted to the ACS Online Abstract Submittal System (OASys). For information and submittal go to www.acs.org/meetings/abstract/abinfo.html. The deadline for submittal is April 1, 2003. "**Extended**" abstracts of presentations are required by the Environmental Division. Extended abstracts must be submitted for the paper to be considered for presentation at the national meeting. The Extended Abstract Instructions are available at: <http://gemini.tntech.edu/~mjlw5030/acspage.html>. Either an electronic copy may be e-mailed as an attachment to the respective symposium organizer OR an original plus 2 copies of extended abstract may be sent to respective symposium organizers. Extended abstracts must be received by April 8, 2003. All general papers will be presented in the Division's poster session.

General Papers.

- T. Mill (see above)

Environmental Chemistry Awards.

- T. Anderson, The Institute of Environmental and Human Health, Texas Tech University, Box 41163, Lubbock, TX 79409-1163, 806-885-4549 ext. 231, Fax 806-885-4577, tanderson@tiehh.ttu.edu.

**The Environmental Chemistry Division
of the
American Chemical Society**

**Presents the Following Awards in Recognition of Excellence
in the Environmental Sciences:**

- | **Distinguished Service Award** (sustained and distinguished contributions to the field of environmental chemistry and to the Division)
- | **Certificate of Merit** (first notable presentation)
- | **Kenneth G. Hancock Memorial Scholarship in Green Chemistry** (contribution in green chemistry)
- | **Graduate Student Award** (excellence in graduate studies)
- | **Graduate Student Research Paper Award** (excellence in research and presentation)

Distinguished Service Award

Members of the Division who demonstrate continued and active participation in the Division and in environmental chemistry will be considered for this award. The nominee must have been a member of the Division for at least ten years and active through presentations at and organization of symposia, effective work on Division committees, regular attendance and participation at National meetings, holding office in the Division and a general attitude and willingness to help in the Divisional work. The award is presented annually at the Fall ACS meeting.

Certificate of Merit Award

A certificate of merit award is given for a notable first appearance before the Environmental Division. If you are planning to make your first presentation at a National American Chemical Society meeting, please notify the Program Chair at the same time you submit your ACS abstract forms and Extended Abstract.

For further information regarding the Distinguished Service Award or the Certificate of Merit, contact: Glenn C. Miller, Dept. of Environmental & Resource Sciences, MS 199, University of Nevada-Reno, Reno, NV 89557, (775)784-4108.

Kenneth G. Hancock Memorial Scholarship in Green Chemistry

To honor his contributions in the field of Green Chemistry, Dr. Hancock's colleagues from academia, government and industry established the Kenneth G. Hancock Memorial Scholarship in Green Chemistry, offered under the auspices of the American Chemical Society's (ACS's) Division of Environmental Chemistry. The Kenneth G. Hancock Memorial Scholarship is awarded annually in conjunction with the Presidential Green Chemistry Challenge Awards Ceremony, administered by the U.S. Environmental Protection Agency (EPA) at the annual Green Chemistry and Engineering Conference sponsored by EPA, ACS and other chemical organizations associated with industry, government and academia. The scholarship provides national recognition for outstanding student contributions to furthering the goals of Green Chemistry (i.e., the research, development and implementation of fundamental and innovative chemical technologies that incorporate the principles of Green Chemistry into chemical design, manufacture and use, and that have the potential to be utilized in achieving national pollution prevention goals). The Kenneth G. Hancock Memorial Scholarship is open to all undergraduate and graduate students.

For further information regarding the Kenneth G. Hancock Memorial Scholarship in Green Chemistry, contact: Tracy Williamson, Office of Pollution Prevention and Toxics (Mail Code 7406), U.S. Environmental Protection Agency, 401 M Street, SW, Washington DC 20460, (202)260-2659.

Graduate Student Award in Environmental Chemistry

The Division of Environmental Chemistry sponsors up to 25 annual awards to full-time graduate students currently enrolled in a United States educational institution in chemistry, environmental engineering or other programs emphasizing environmental chemistry. These students must have completed one full year of graduate study at their current institution by the date of announcement of the awards (January or February).

The award is based upon students' records in course work, evidence of research productivity and on statements from graduate faculty advisors. Primary emphasis will be given to the students' potential for future contributions as professionals in environmental chemistry. The application for the award is submitted by the graduate students' faculty advisors.

Graduate students who receive the award will receive a one year membership in the Division of Environmental Chemistry (which includes the Preprints of Extended Abstracts for the two National meetings and the Division newsletter, EnvirofACS) and a one year subscription to *Environmental Science & Technology*. Awardees will be publicized in the Preprints, *ES&T* and EnvirofACS.

Graduate Student Research Paper Award

The Division of Environmental Chemistry also sponsors the Graduate Student Research Paper Award, the highest honor granted by the Division for students. Up to five awards are presented annually. All graduate students enrolled full-time in chemistry, environmental engineering or other programs emphasizing environmental chemistry are eligible.

The research paper must be relevant to environmental chemistry, the student must be the first and major author, and the work must have been done while attending the student's current institution. The paper may have been submitted to a journal at the time of submission, but it should not have already been published or presented at another meeting.

Graduate students who receive this award will present their papers at the American Chemical Society National meeting in the Fall. Each awardee will also receive a \$500 cash award at the Environmental Division Dinner at the national meeting, a one year membership in the Environmental Division and recognition in EnvirofACS, the newsletter of the Division and in *ES&T*.

Application materials and announcements regarding the Graduate Student Award in Environmental Chemistry and the Graduate Student Research Paper Award are distributed in the Fall of each year. If you do not receive the announcement or have **further questions regarding eligibility or application requirements, contact: Todd A. Anderson, The Institute of Environmental and Human Health, Texas Tech University, P.O. Box 41163, Lubbock, TX 79409-1163, (806)885-4549 ext 231, Fax (806)885-4577, todd.anderson@tiehh.ttu.edu.**

Distinguished Service Award Winners

1957	W.D. Collins A.N. Buswell Edward Bartow A.S. Behrman R.C. Bardwell	1973	James P. Lodge, Jr. S. Charles Caruso
1958	F.W. Mohlman W.D. Hatfield	1974	Henry C. Bramer Benjamin F. Willey Louis F. Wirth, Jr.
1959	J.R. Baylis D.K. French	1975	Francis L. Estes
1960	C.S. Howard O.M. Smith	1977	Alvin P. Black John J. Dwyer J. Carrell Morris
1961	William Steriker Fred Lindsey	1978	Robert A. Baker Aaron A. Rosen
1962	Hovhanness Heukelekian L.D. Betz	1979	Frank M. Middleton C. Ellen Gonter
1963	William Allan Moore William L. Lamar	1984	Nina I. McClelland Donald F. Adams John I. Tealsey
1965	Louis F. Warrick Clair S. Boruff	1985	Lawrence H. Keith Leslie B. Laird Roger A. Minear
1967	S. Ken Love Richard D. Hoak	1986	Robert L. Jolley
1968	John J. Maguire H. Gladys Swope	1987	Herbert E. Allen
1969	Hilding B. Gustafson Henry C. Marks	1988	J. Donald Johnson
1970	George Hatch A.A. Berk	1989	Gordon E. Bellen
1971	J. Fred Wilkes T.E. Larson	1990	Irwin H. (Mel) Suffet V. Dean Adams
1972	Robert Ingols Calvin Calmon	1992	Richard G. Zepp
		1998	Alan W. Elzerman
		1999	Jurgen Exner

Edward Bartow Award

1952	H.C. Marks
1953	F.J. Ludzack
1954	E.B. Tooper
1955	Frank M. Middleton
1956	John J. Maguire
1957	W. Allen Moore
1959	Aaron A. Rosen
1963	Robert S. Ingols
1964	Walter Chamot
1966	L.C. Terriere
1967	Henry G. Schwartz, Jr.
1969	Harry P. Kramer

Fraser Johnstone Award

1966	Andrew E. O'Keeffe
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ACS Award for Creative Advances in Environmental Science and Technology
(Sponsored by Air Products and Chemicals, Inc.)

1980	James J. Morgan	1992	Glen E. Gordon
1981	Philip W. West	1993	John H. Seinfeld
1982	Jack G. Calvert	1994	Steven J. Eisenreich
1983	F. Sherwood Rowland	1995	Donna L. Bedard
1984	Julian Hecklen	1996	Donald H. Stedman
1985	Arthur Fontijn	1997	Charles E. Kolb
1986	Eugene E. Kenaga	1998	Mario J. Molina
1987	Joseph C. Arcos	1999	Terry F. Bidleman
1988	A. Welford Castleman, Jr.		James F. Pankow
1989	James G. Anderson	2000	R.K.M. Jayanty
1990	David M. Golden	2001	Michael R. Hoffmann
1991	Ronald A. Hites	2002	Roger Atkinson

ACS Award for Pollution Control
(Sponsored by Monsanto Company)

1973	A.J. Haagen-Smit
1974	H.S. Johnston
1975	Aubrey P. Altshuller
1976	Thurston E. Larson
1977	Werner Stumm

Certificate of Merit

1952	A.W. Busch Lillian A. Russell E.W. Mood R.C. Kroner	1962	James J. Morgan Roger N. Saragent Otie J. Sproul
1953	W.N. Hearon A. Eugene Bowers L.J. Schmauch Frank E. Clark	1963	Max Blumer Ronald S. Joyce Irwin A. Rabin Murrell L. Salytsky Joseph Shapiro Ronald M. Siverstein Walter J. Weber, Jr.
1954	R.E. Anderson Earl Robert Gerhard Willard F. Libby	1964	Hugh Eisenhauer George P. Fitzgerald R.B. Grieves Louis Hemphill L.L. Wikstrom
1955	H.A. Barker Raymond A. Kolbeson Orville Wyss	1965	Solloff E. Bishop Glenn E. Johnson Don C. Lindsten Samuel H. Sharman Robert G. Spicher
1956	Clayton F. Callis	1966	Harvey W. Boyle Roy V. Comeaux Robert A. Erb John W. Hamaker
1957	R.H. Burttschell Emillio Savinelli A. Lovis Medin J. Kenneth Brown		
1962	Richard L. Davie Thomas F. Demmitt Norman Michael		

Certificate of Merit (continued)

1966	James J. Hickey Ulo Kligemagt Gordon C. Ortman Peter H. Westigard R.W. Zwich	1986	Jennifer E. Stern James E. Woodrow
1967	F.C. Goodrich F. Helfferich F.J. Pocock J.P. Quirk J. William Sugar	1987	Patrick H. Davies Gary A. Epling Jennifer Field William Fish T. Mark Florence James Graineger Steven B. Hawthorne Geneva M. Omann Ralph J. Portier Angel L. Rivera John E. Rogers Thomas H. Row
1968	Mark W. Tenney		
1971	L.L.C. Sorensen P.L. Levins		
1973	Barbara J. Slatt	1988	W.H. Benson Colleen Tashiro Amy P. Toole
1975	Linda A. Deans		
1977	Rose Ann Cochran David M. Haile Robert W. Looyenga	1990	Gerald T. Coyle Sayed Z. El-Sayed David J. Miller Robert F. Mouradian T.R. Schwartz Helena Solo
1980	Stuart W. Krasner		
1981	Purnendu K. Dasgupta Jeral L. Schnoor	1991	Wayne F. Chan Dennis L. Corwin Tchonon Coulibaly Joseph E. Gadowski Margarita Gutierrez-Ruiz Adam S. Harris Linda S. Lee Mark A. Nanny Patricia Snyder
1986	Marcia F. Collins Douglas Craft Werner R. Haag Robert J. Kieber Joseph J. Pignatello Richard J. Pruell		

Certificate of Merit (continued)

1991	Penny Stackhouse Debra H. Thomas Patricia Tveite	1995	Suresh Chandran Yolanda Fintschenko Robert N. Lerch Waihung Lo
1992	Stephen E. Cabaniss Deborah J. Fox Susan A. Hatlevig Suzanne M. McClung Margaret S. Mills Daniel D. Riemer Frank E. Scully, Jr. Martin St. Clair M.M. Taylor Christine L. Tiller Lee J. Yoo	1996	Allen W. Apblett John C. Bart Amy E. Childress Seungkwan Hong Tiehong Huang Jeanne A. Itak Kimberly L. Jones Herman O. Krabbenhoft Amy E. Witter
1993	Jeff Collett, Jr. Kent W. Schmidt Staci Lynn Simonich Rengao Song Paul Westerhoff	1997	William A. Arnold Sandip Chattopadhyay Jennifer F. Clark Manvendra K. Dubey David A. Jeffrey Perry L. McCarty
1994	Thomas P. Franz Richard W. Gullick William P. Hamilton Ewa Lipczynska-Kochany Gary M. Litton Jimena P. Lopez Janice D. Makos Anuradha Ramaswami Thomas M. Young	1998	William Hagar Edward Heyse Frank E. Huggins Richard W. Hurst Robert J. Lagomarsino Eugene J. LeBoeuf Richard J. Murphy James J. Pagano Lisa L. Phegley Tammy P. Taylor
1995	Lisa Axe Damia Barcelo Kathleen E. Brummel Susan E. Burns		

Certificate of Merit (continued)

1998 Jon Michael Williams
 Marek A. Wojtowicz

Graduate Student Award Winners for 2002
Sponsored by the Division of Environmental Chemistry

Name	Advisor	Graduate Program
Joseph Bushey	David Dzombak	Carnegie Mellon University
James Day	F. Michael Saunders	Georgia Tech
Christina Friedel	Kevin Johnson	Southern Illinois University
Michael Gershenzon	Paul Davidovits	Boston College
Yi He	David Locke	Queens College of CUNY
Qingguo Huang	Walter Weber	University of Michigan
Brian Quinn	Joseph Delfino	University of Florida
Tanita Sirivedhin	Kimberly Gray	Northwestern University
Sharon Walker	Menachem Elimelech	Yale University
Kun-Lin Yang	Sotira Yiacoumi	Georgia Tech
Jian Zhan	Yuegang Zuo	University of Massachusetts, Dartmouth

Graduate Student Award Winners

1986	Marijan Ahel Joseph T. Angley Stephen E. Cabaniss Patricia V. Cline Allen P. Davis Richard T. DeCesar Frank M. Dunnivant Thomas D. Gauthier Kimberly A. Gray Stephen R. Harper George D. Harris Hans Jannasch James N. Jensen Deborah J. McKechnie James R. Mihelcic Daniel L. Norwood Mary E. Pitts Chittaranjan Ray Charles V. Shorten Thomas J. Simpkin James E. Szecsody Mark A. Tumeo	1987	Mark Milke J. William Munger Meredith Newman Stephen G. Pedersen Mukund Ramamurthi Ann E. Sheffield Susan Stripp Paul G. Tratnyek Wanjia Zhang
		1988	Tekeshi Arakai Joel Eric Baker Gaboury Benoit Greg Butters Yu-Ping Chin Gary P. Curtis Edward Franzblau Kenneth Michael Hart Diane M. Hermann Joon-Wun Kang Anil Kumar Brent L. Lewis Winston T. Luke Tom McDonald Terese M. Olson Debra R. Reinhart James R. Rhea Kevin G. Robinson Lucinda B. Sonnenberg John Storey Peter D. Tsakanikas
1987	Morton A. Barlaz Barbara A. Bates John Borrazzo Andrea M. Dietrich Talbert N. Eisenberg Julia E. Fulghum Nancy J. Hayden George B. Jarvis Judy S. LaKind Cheryl Matthias Janet A. Mayernik John F. McCarthy Lyn M. McIlroy		
		1989	Lisa M. Alvarez Todd A. Anderson Debra A. Backhus Kathy Boswell

Graduate Student Award Winners (continued)

1989	Suda Bunduwongse Menachem Elimelech Mohamad R. Farvardin Gary M. Hutter Seungdo Kim Leslie S. Laudon Caroline B. Purdy Janice P. Stowell Christine L. Tiller	1991	Hak Sung Lee George Murgel Mark A. Nanny Brian E. Rood John Sagebiel Mark Schlautman David L. Sedlak Melinda A. Trizinsky
1990	William M. Davis Keith E. Dennett Matthew B. Gerhardt Kathryn Hunchak-Kariouk Joe Jersak James Jersey Man-Chi Lo Steve Machemar Karal Mesuere Sandra K. Miles A. Lynn Roberts Joseph G. Schnable Youshang Zang Yuewei Zhu	1992	Amy Lunn Bryce Susan E. Burns Margaret C. Carter Barbara R. Coughlin Shinoka Fujita Keri C. Hornbuckle Sally Jo Palmer Susan E. Powers Schawn Shottler Chichwen Shao Rengao Song Richard Sutton Anthony J. Tesoriero Kathryn K. Levenberg Ticho Dharanija Vasudevan Qingxi Wang Charles Shiu Wong Yuping Xu
1991	Diane Achman David A. Edwards Thomas P. Franz, Jr. Kevin H. Gardner Yuyang Gong Anne M. Hoylman Mark Jacobs Ramesh Lyer Lynn E. Katz	1993	Barbara Anderson Nada Assaf-Anid Joseph Chung Mamadou S. Diallo Anne Falke Lai Gui

Graduate Student Award Winners (continued)

1993	Corey Knoop Ellen Louise Kruger Suen-Zone (Jack) Lee Leah J. Matheson Angus E. McGrath Kurtis G. Paterson B. Douglas Reeves Carolyn J. Sampson Sukalyan Sengupta Jiamin Wan Jeyong Yoon	1995	Lisa M. Borbridge Amy Childress Britt E. Erickson Seungkwan Hong Michael J. Howdeshall Suilou Huang Margaret Hunter Emmanuel Iyiegbuniwe Timothy L. Johnson Kimberly L. Jones Franz-Günter Kari Alok Kumar Jian Li Wentai Luo Edward O'Loughlin Christopher M. Reddy Sujoy Roy Jennifer Sasaki Bo Shi Jean M. Smolen Maryann Suero Ying Xie
1994	Zafar Adeel Muhammad Ashraf Ali Cort Anastasio Lisa Axe Jon David Chorover Harry R. Beller Kirk E. Dean Baolin Deng Susan Grube Donaldson Jason Derek Geddes Gregory W. Harrington Edward Heyse John F. Kenneke Shi-Ping Lia Yarrow Nelson Roger Pearson Staci L. Simonich Bryan M. Smith Jeffrey C. Wallace Liza P. Wilson Jingfend Wu	1996	Brett Brunk Joel Burken Colin Chen Neal Durant Cynthia Evanko Alessandro Franchi Tohren Kibbey Daniel Schmelling Annette Trowbridge John J. Waypa Jennifer Wilkie Wells Wei-Shih Wu

Graduate Student Award Winners (continued)

1996	Yujun Yin Thomas Young Jianzhen Yu Dongye Zhao Huan Zhu	1998	Timothy Tsukamoto Jianzhong Zheng Meifang Zhou
1997	Blakely Adair Barbara Bergen Sandip Chattopadhyay Yuan Chen Peter D'Adamo Jeff Darland Annette Dietz Susan Glassmeyer Weilin Huang Joon Min Matthew Morrison Michelle Scherer Brian Schroth Ning Sun Peter Vikesland Alex Yavich	1999	David Adamson William Arnold Hiroshi Awata William Bedsworth Robert Bruant Paul Brunciak Elizabeth Butler Martin Johnson Tarek Ladaa Brian Mader Heath Mash William Mills Tammy Taylor Eric Vrijenhoek
1998	W. Wayne Brubaker Rajat Ghosh Yann Le Gouellec Carolyn Krueger Eugene LeBoeuf Angela Lindner Brian Logue Huizhong Ma Penney Miller Annett Sullivan Denise Taylor Lisa Ann Totten	2000	Joel Bandstra Rajat Chakraborti Jeffrey Chen Brian Desharnais Paul Hartmann Sarunya Hengpraprom Mehmet Kitis Jens-Uwe Kuhn Tie Li Katrice Lippa Shaun Mendonsa C. Andrew Ramsburg Alexa Rihana Darryl Roberts Julia Rogers Reggie Spaulding

Graduate Student Award Winners (continued)

2000	Kavitha Subramaniam Weihong Wang Ted Wu Haojiang Zhou Julie Zimmerman	2002	Tanita Sirivedhin Sharon Walker Kun-Lin Yang Jian Zhan
2001	Jim Chen Anne-Marie Compton Amy Dahl Karlin Danielsen Dionysios Dionysiou Juel Gibbons Kim Hageman Thomas Jabusch Ryan James T. Michael Keinath Ted Klupinski Jill Kostel Jason Lynch Mike McCormick James Morris James Nurmi Derek Peak Aaron Peck Ed Scollon Alexandra Stenson Mazyar Zeinali		
2002	Joseph Bushey James Day Christina Friedel Michael Gershenson Yi He Qingguo Huang Brian Quinn		

Graduate Student Paper Award Winners for 2001
Sponsored by the Division of Environmental Chemistry

"Oxidation of Organic Contaminants using a Thin-film Rotating Disk Photocatalytic Reactor (RDPR): Effect of Oxygen Concentration in the Gas Phase and Influence of Oxygen Mass Transport in the Thin Liquid Film"

Dionysios D. Dionysiou and Makram T. Suidan, Department of Civil and Environmental Engineering, University of Cincinnati

"*In situ* Anaerobic Transformation of Trichlorofluoroethene in Trichloroethene-contaminated Groundwater"

Kimberly J. Hageman, Jennifer A. Field, Jonathon D. Istok, Lewis Semprini and Timothy E. Buscheck, Department of Chemistry and Department of Environmental and Molecular Toxicology, Oregon State University

"Electrochemical Investigation of the Rate Limiting Mechanisms for Trichloroethylene and Carbon Tetrachloride Reduction at Iron Surfaces"

Tie Li and James Farrell, Department of Chemical and Environmental Engineering, University of Arizona

"Kinetics of Chromate Reduction by Carbonate Green Rust"

Aaron G.B. Williams and Michelle M. Scherer, Department of Civil and Environmental Engineering, University of Iowa

"Spectroscopic Evidence for a Cation- π Sorption Mechanism for Polycyclic Aromatic Hydrocarbon Sorption to Hydrated Surfaces of Minerals"

Dongqiang Zhu, Bruce E. Herbert, Mark A. Schlautman and Elizabeth R. Carraway, Department of Geology and Geophysics, Texas A&M University

Note: **Graduate student paper award winners are presented in bold; faculty advisors are underlined.**

Graduate Student Paper Award Winners

1987	Allen P. Davis Frank M. Dunnivant Wen H. Pan	1993	Grace M. Haggerty Wei Li Jiamin Wan
1988	G.C. Germann Janet G. Hering G.H. Peters C.V. Shorten C. Yurteri	1994	M.S. Diallo Jason Derek Geddes B.A. Holmen S.T. Martin Staci L. Simonich
1989	Deb Backhus Larry B. Barber II Meredith E. Newman Stuart A. Rounds	1995	Zafier Adeel Nicola J. Peill Dharni Vasudevan Jeffrey C. Wallace
1990	Bernadine A. Bonn Jennifer A. Field A. Lynn Roberts David L. Sedlak Guoshun Zhuang	1996	S. Colin Chen Cikui Liang David L. Lord Jean M. Smolen Nelson M. Yarrow
1991	Todd A. Anderson Sarah A. Green Murray Hackett Joseph N. Ryan John M.E. Storey	1997	Ching-Hua Huang Weilin Huang Tohren C.G. Kibbey Michelle M. Scherer Diane M. Wagrowski
1992	Diane R. Achman Keri C. Hornbuckle Laura L. McConnell Simon O. Pehkonen Charles S. Wong	1998	Barbara J. Bergen John M. Lendvay Huizhong Ma Mahaligam Ravichandran Lisa A. Totten William A. Arnold Chia-Chen Chen Martin D. Johnson
1993	Nada Assaf-Anid Huiling Ding		

Graduate Student Paper Award Winners

- | | |
|------|-------------------------------------------------------------------------------------------------|
| 1999 | Ping Li
Peter Vikesland |
| 2000 | Brian Desharnais
Paul Hartmann
Brian Mader
Alexa N. Rihana
Timothy J. Strathmann |
| 2001 | Dionysios D. Dionysiou
Kimberly J. Hageman
Tie Li
Aaron G.B. Williams
Dongqiang Zhu |

Based on Division of Environmental Chemistry Symposia

Books Available From: ACS Books/Oxford University Press

Analysis of Environmental Endocrine Disruptors. Larry Keith, Larry Needham and Tammy Jones, Symposium Series 747, \$75

Aquatic Chemistry: Interfacial and Interspecies Processes. Chin Pao Huang, Charles R. O'Melia and James J. Morgan, Editors, Advances in Chemistry Series 244, \$135

Benign by Design: Alternative Synthetic Design for Pollution Prevention. Paul T. Anastas and Carol A. Farris, Editors, Symposium Series 577, \$70

Bioremediation Through Rhizosphere Technology. Todd A. Anderson and Joel R. Coats, Editors, ACS Symposium Series 563, \$70

Designing Safer Chemicals: Green Chemistry for Pollution Prevention. Stephen C. DeVito and Roger L. Garrett, Editors, Symposium Series 640, \$95

Electromagnetic Fields: Biological Interactions and Mechanisms. Martin Blank, Editor, Advances in Chemistry Series 250, \$145

Environmental Biomonitoring: Exposure Assessment and Specimen Banking. K.S. Subramanian and G.V. Ivengar, Editors, Symposium Series 654, \$110

Environmental Chemistry of Lakes and Reservoirs. Lawrence A. Baker, Advances in Chemistry Series 237, \$165

Environmental Epidemiology. William M. Draper, Editor, Advances in Chemistry Series 241, \$90 (hardcover), \$60

Environmental Immunochemical Methods: Perspectives and Applications. Jeanette M. Van Emon, Clare L. Gerlach and Jeffrey C. Johnson, Editors, Symposium Series 646, \$115

Innovative Subsurface Remediation: Field Testing of Physical, Chemical and Characterization Technologies. Mark L. Brusseau, David A. Sabatini, John S. Gierke and Michael D. Annable, Editors, Symposium Series 725, \$115

Green Chemistry: Designing Chemistry for the Environment. Paul T. Anastas and Tracy C. Williamson, Symposium Series 626, \$95

Groundwater Residue Sampling Design. Ralph G. Nash and Anne R. Leslie. ACS Symposium Series 465, \$110

Halon Replacements: Technology and Science. Andrzej W. Mistolek and Wing Tsung, Symposium Series 611, \$120

Herbicide Metabolites in Surface Water and Groundwater. Michael T. Meyer and M. Thurman, Symposium Series 630, \$115

Immunochemical Technology for Environmental Applications. Diana S. Aga and E. Michael Thurman, Editors, Symposium Series 657, \$130

Molecular Markers in Environmental Geochemistry. R.P. Eganhouse, Editor, Symposium Series 671, \$135

Nuclear Magnetic Resonance Spectroscopy in Environmental Chemistry. Mark A. Nanny, Roger A. Minear and Jerry A. Leenheer, Editors, \$70

Persistent, Bioaccumulative and Toxic Chemicals I: Fate & Exposure. Robert Lipnick, Editor, Symposium Series 772, \$135

Persistent, Bioaccumulative and Toxic Chemicals II: Assessment & New Chemicals. Robert Lipnick, Editor, Symposium Series 646, \$135

Phytoremediation of Soil and Water Contaminants. Ellen L. Kruger, Todd A. Anderson and Joel R. Coats, Editors, Symposium Series 664, \$120

Plastics, Rubber and Paper Recycling: A Pragmatic Perspective. Charles P. Rader, Editor, Symposium Series 609, \$130

Pollution Prevention in Industrial Processes. Joseph J. Breen and Michael J. Dellarco, ACS Symposium Series 508, \$95

Radiation and Public Perception. Jack P. Young and Rosalyn S. Yalow, Editors, Advances in Chemistry Series 243, \$80 (hardcover), \$40 (paper)

Surfactant-Enhanced Subsurface Remediation: Emerging Technologies. David A. Sabatini, Robert C. Knox and Jeffrey H. Harwell, Symposium Series 594, \$105

Water Disinfection and Natural Organic Matter: Characterization and Control. Roger A. Minear and Gary Amy, Editors, Symposium Series 649, \$115

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Chlorine and Chlorine Compounds in the Paper Industry. Jurgen H. Exner and Victor Turoski, Editors, \$104.95

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42(1)	223, Spring, 2002 Orlando, FL	Analysis of Emerging Contaminants Using LC/MS/MS; Membrane Processes and Applications; New Analytical Techniques for Dissolved Organic Matter; The Science and Policy of Topical Antimicrobial Agents; ACS Award for Creative Advances in Environmental Science and Technology: Honoring Dr. Roger Atkinson (Sponsored by Air Products, Inc.); Mercury in the Environment: Assessing and Managing the Multimedia Risks; General Papers	20.00 CD
41(2)	222, Fall, 2001 Chicago, IL	Analysis of Environmental Phenomena at Molecular Scales; Remedation of Water and Soil Contaminated with Gasoline Oxygenates: <i>In Situ</i> and <i>Ex Situ</i> Treatment Technologies; Chemical Transformations of Mercury in Aquatic Systems; Emerging Issues in the Great Lakes; Elegant Analytical Chemistry Applied to Environmental Problems: A Practical Symposium; Environmental Chemistry Awards; Themes in Potable Water Chemistry; General Papers	15.00 CD

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41(1)	221, Spring, 2001 San Diego, CA	Field Analytical Chemistry: Techniques, Technologies and Applications; Sustainable Chemistry in the New Millenium; Advances in Remediation of Heavy Metals in the Environment; Biogeochemistry of Environmentally Important Elements; Elegant Analytical Chemistry Applied to Environmental Problems: A Practical Symposium; Environmental Trends; ACS Award for Creative Advances in Environmental Science and Technology: Honoring Dr. Michael R. Hoffman (Sponsored by <i>Air Products and Chemicals, Inc.</i>); Innovative Strategies for the Remediation of Chlorinated Solvents and DNAPLs in the Subsurface; Tropospheric Chemistry; General Papers	15.00 CD
40(2)	220, Fall, 2000 Washington, DC	Sequestration of Organic Solutes in Natural Organic Matter and Mineral Aggregates; Electrochemical Methods for the Environmental Analysis of Trace Metal Biogeochemistry; Scientific Uncertainty and Risk Management; Membrane Separation Processes in Aquatic Systems; Chemical-Biological Interactions in Contaminant Fate; Chemical Speciation and Reactivity in Water Chemistry and Water Technology: A Symposium in Honor of James J. Morgan; Environmental Chemistry Awards Symposium; Environmental Chemistry: Emphasis on EPA and EPA Supported Research; General Papers	45.00 print 15.00 CD
40(1)	219, Spring, 2000 San Francisco, CA	Issues in the Analysis of Environmental Endocrine Disruptors; Specialty Chemicals in the Environment; Exploring the Environmental Issues of Mobile, Recalcitrant Compounds in Gasoline; ACS Award for Creative Advances in Environmental Science and Technology: Honoring Dr. R.K.M. Jayanty (Sponsored by <i>Air Products and Chemicals, Inc.</i>); Computational Methods in Environmental Chemistry; Environmental Chemistry of the Atmosphere: 2000 and Beyond; Environmental Chemistry of Water: 2000 and Beyond; General Papers	25.00 print
39(2)	218, Fall, 1999 New Orleans, LA	Perchlorate in the Environment; Analytical Challenges for Assessing Environmental Exposures to Children; Environmental Chemistry Awards; Environmental Issues on the Gulf Coast; Chiral Chemistry in the Environment; Waste: Remediation and Related Issues; Computer Software for Environmental Chemistry Education; General Papers	15.00 CD

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39(1)	217, Spring, 1999 Anaheim, CA	Persistent, Bioaccumulative, Toxic Chemicals; Natural Organic Matter and Disinfection By-Products: Characterization and Control in Drinking Water; Interfacial and Colloidal Phenomena in Aquatic Environments; ACS Award for Creative Advances in Environmental Science & Technology: Honoring James F. Pankow - Gas/Particle Partitioning: The State of Science (Sponsored by <i>Air Products and Chemicals, Inc.</i>); ACS Award for Creative Advances in Environmental Science & Technology: Honoring Terry F. Bidleman (Sponsored by <i>Air Products and Chemicals, Inc.</i>); Green Chemistry in Academia, Industry and Government; Green Chemistry Education; Recent Advances in Environmental Chemical Sensors and Biosensors; General Papers	25.00 print 15.00 CD
38(2)	216, Fall, 1998 Boston, MA	Humic Substance-Mediated Environmental Reactions; Environmental Impact of Fossil Fuel Utilization; Risk Assessments of Radioactive/Chemical Contamination; Intentional Environmental Tracers; Environmental Chemistry Awards; Advances in the Analysis of Environmental Endocrine Disruptors; Research and Education Challenges in Environmental Chemistry; General Papers	20.00
38(1)	215, Spring, 1998 Dallas, TX	Waste Treatment Processes; Environmental Applications of Geographic Information Systems (GIS); ACS Award for Creative Advances in Environmental Science and Technology in Honor of Mario J. Molina (Sponsored by <i>Air Products and Chemicals, Inc.</i>); The Presidential Green Chemistry Challenge; Tributyltin Compounds in the Aquatic Environment; General Papers	20.00
37(2)	214, Fall, 1997 Las Vegas, NV	Isolation, Fractionation, Characterization and Reactivity of Environmental Colloids; Soil Contaminant Remediation Issues; Mechanisms and Effects of Resistant Sorption Processes of Organic Compounds in Natural Particles; Student Awards Symposium; Environmental Programs in Nevada; General Papers	20.00

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37(1)	213, Spring, 1997 San Francisco, CA	Redox Reactions in Natural and Engineered Aqueous Systems; Global Climate Change: Uncertainties and Research Needs; Environmental Application of Biosensors; Green Chemistry/Environmentally Sustainable Manufacture as a Competitive Advantage; Field Testing of Innovative Subsurface Remediation Technologies; ACS Award for Creative Advances in Environmental Science and Technology in Honor of Charles E. Kolb: Atmospheric Chemistry as a Science and a Service (Sponsored by <i>Air Products and Chemicals, Inc.</i>); Degradation of Chemicals with Significant Environmental Impact; Environmental Fate and Effects of Gasoline Oxygenates; General Papers
20.00		
36(2)	212, Fall, 1996 Orlando, FL	Application of Molecular Markers to Environmental Geochemistry; Fundamentals of Membrane Separation Processes in Aquatic Systems; Environmental Chemistry Resources on the Internet; Student Awards Symposium; General Papers
20.00		
36(1)	211, Spring, 1996 New Orleans, LA	Development and Applications of Immunoassays for Environmental Analysis; Environmental Restoration of Bays and Estuaries; ACS Award for Creative Advances in Environmental Science and Technology: Honoring Donald H. Stedman (Sponsored by <i>Air Products and Chemicals, Inc.</i>); Petroleum Contamination in the Environment: Assessment and Remediation; General Papers
20.00		
35(2)	210, Fall, 1995 Chicago, IL	Molecular Modeling and Environmental Computational Chemistry; Spectroscopy of Atmospheric Aerosols; Chlorine and Chlorine Compounds in the Paper Industry; Aqueous Oxidants and Photooxidants: Mechanisms and Process Kinetics (A Symposium in Honor of Jurg Hoigne); Mechanistic Environmental Photochemistry; Student Awards; Disinfection By-Products and NOM Precursors: Chemistry, Characterization, Control; General Papers
12.00		
35(1)	209, Spring, 1995 Anaheim, CA	Cloud and Aerosol Atmospheric Chemistry; Chemistry of Herbicide Metabolites in Surface and Ground Water; Urban Atmospheric Chemistry; Influence of Coupled Chemical-Biological Processes on Transport and Remediation of Contaminant in the Subsurface; Colloidal and Interfacial Phenomena in Aquatic Environments; Contaminant Remediation with Zero-Valent Metals; General Papers
12.00		

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34(2)	208, Fall, 1994 Washington, DC	Design for Environment: The Environmental Paradigm for the Twenty-first Century (<i>A Memorial to Kenneth G. Hancock</i>); Implementations of Current Environmental Regulations on Petroleum and Fuel Industries: Technology and Policy Issues; The Environmental Fate of Pharmaceuticals and Other Complex Organic Molecules; Groundwater Contamination and Control: The State of the Art; Municipal Solid Waste: Problems and Solutions; Student Awards Symposium; Advances in Replacements for Ozone Depleting Compounds; Environmental Risk Decision Making: Values, Perceptions and Ethics; General Papers	12.00
34(1)	207, Spring, 1994 San Diego, CA	Scientific and Regulatory Issues Associated with Sediment Contamination; Earth in the Balance: Global Environment, Energy, Technology Transfer and Policy Issues for Industrial and Developing Nations; Remediation of Hazardous Waste Sites; Human Health Perspectives on Exposure to Chemicals at Hazardous Waste Sites; Physical-Chemical Processes Controlling Contaminant Mobility in Aquatic Environments; Solving Problems in Environmental Chemistry using Stable Isotope Labeled Compounds; ACS Award for Creative Advances in Environmental Science and Technology: Honoring Steven J. Eisenreich; Surfactant-Enhanced Remediation of Subsurface Contamination: Emerging Technologies; Atmospheric Chemistry of Biogenic Hydrocarbons; Environmental Successes in the Chemical Industry; General Papers	12.00
33(2)	206, Fall, 1993 Chicago, IL	Advances in Environmental Analytical Chemistry; Disinfection By-Products in Water Treatment: The Chemistry of Their Formation and Control; Environmental Successes in the Chemical Industry; Student Awards Symposium; Redefining the MDL: Policy and Technical Implications; Alternate Synthetic Design for Pollution Prevention; General Papers	12.00
33(1)	205, Spring, 1993 Denver, CO	NMR Spectroscopy in Environmental Science and Technology; Electromagnetic Fields and Environmental Health Effects; 1993 ACS Award for Creative Advances in Environmental Science and Technology: Recent Advances in Atmospheric Chemistry; Alternative Fuels and the Environment; Applications of Supercritical Fluid Extraction; Continuous Flow Liquid-Liquid Extraction and Other Methods for Isolating Trace Organic Pollutants in Water; Environmental Successes in the Chemical Industry; General Papers	12.00

SYMPOSIA, SPECIAL TOPICS AND ORGANIZERS

GENERAL PAPERS

THEODORE MILL has conducted basic and applied research at SRI on environmental reactions of organic compounds for about thirty years. Recent studies include oxidation of aminodinitrotoluenes, aqueous and thin film photolysis of dinitramide ion and photoreactions of aqueous natural organic material. He has also studied oxidation pathways in hydrocarbons, lipid membranes and asphalt. In addition, Dr. Mill has studied photooxidation and hydrolysis reactions in surface waters to develop test guidelines and predictive models for environmental fate of synthetic organic compounds. He has published about 85 papers in these areas of chemistry. Dr. Mill received his Ph.D. at the University of Washington (Seattle) and came to SRI in 1960 after a postdoc year at Yale and three years at the Du Pont Experimental Station. He is a member of AAAS, ACS, AGU and SETAC and served as chair of the Santa Clara Valley ACS section in the mid 70s. He currently serves as alternate councilor to the division.

ANALYSIS OF EMERGING CONTAMINANTS USING LC/MS/MS

This symposium is focused on the use of LC/MS/MS to determine the identity of environmental unknowns and their degradates in the areas of environmental pharmaceuticals (such as antibiotics, steroids, analgesics, etc.), endocrine disrupters (steroids and steroid-like compounds) and pesticides, as well as other relevant classes of environmental compounds, such as surfactants and polycyclic aromatic hydrocarbons. These compounds are of emerging concern as new environmental contaminants.

In the past few years many new instruments have been developed for the LC/MS/MS analysis of unknown compounds. These systems include triple quadrupole mass spectrometers, ion-trap mass spectrometers and quadrupole-time-of-flight mass spectrometers (Q-TOF). These instruments may be used in conjunction with single quadrupole LC/MS systems, LC/NMR (nuclear magnetic resonance) and LC/MS-TOF systems to quickly determine the structure and identity of unknown environmental compounds. This symposium focuses on these instrumental methods, comparing and contrasting their abilities to determine the structure of emerging contaminants, as well as examples of their use.

Because a typical water or soil sample contains a complex, heterogeneous mixture of organic constituents, it is difficult to identify compounds unless standards are available or library spectra are used for identification. This approach has been used in gas chromatography/mass spectrometry for the identification of unknowns. However, standards and library spectra are often not available for identification of environmental

unknowns using LC/MS. Thus, this symposium will discuss various types of MS/MS instrumental methods for using diagnostic ions, library searching and "on the fly" analysis techniques for identifying unknown compounds using various strategies of LC/MS/MS.

Another goal of the meeting is to bring together experienced chemists using LC/MS/MS to discuss approaches for identification of environmental unknowns and to prepare a symposium volume that will be published by the American Chemical Society from the proceedings of the meeting.

E. MICHAEL THURMAN is a research hydrologist with the U.S. Geological Survey at the Organic Geochemistry Research Laboratory in Lawrence, Kansas. He has worked with the U.S. Geological Survey for +25 years, since the completion of his Ph.D. in Organic Geochemistry at the University of Colorado. He worked for 12 years in the regional office of the Research Program of the U.S.G.S in Denver, and spent three years managing the regional office of the National Research Program in Denver in areas of hydrology and water chemistry. The past 14 years have been spent at the District Office in Kansas setting up and directing research on herbicides, their degradates and other emerging contaminants in ground water, surface water and rainfall of the midcontinental United States, a 12-state region that is impacted by agricultural nonpoint-source pollution.

The laboratory in Kansas has become an active center for research on herbicide contamination in the Midwest. New methods of analysis of herbicides and emerging contaminants have been developed which include automated solid-phase extraction, GC/MS, LC/MS, LC/MS/MS and immunoassay procedures for many pollutants. These methods have been applied to over 40,000 samples from the Midwestern United States. Recent papers on these studies have been published in *Environmental Science & Technology* and *Analytical Chemistry*. The laboratory has funded and directed research for a number of graduate students working in environmental chemistry at the University of Kansas.

IMMA FERRER is a research post-doc with the U.S. Geological Survey at the National Water Quality Laboratory in Denver, Colorado since January 2000. She completed her Ph.D. in the application of liquid chromatography and mass spectrometry techniques for the detection of pesticides in environmental matrices at the University of Barcelona, Spain in 1999. At the present time, she is developing methods for the detection of emerging contaminants such as pharmaceuticals, surfactants and degradation products using mass spectrometry and tandem mass spectrometry techniques. Recent papers on these studies have been published in *Environmental Science & Technology* and *Analytical Chemistry*.

MEMBRANE PROCESSES AND APPLICATIONS

Membranes represent one of the newly applied, advanced treatment processes that offer a versatile approach to meeting multiple water quality objectives. Membrane technologies that have the greatest immediate application to water and wastewater treatment are pressure-driven membrane processes, which include reverse osmosis (RO), nanofiltration (NF), ultrafiltration (UF) and microfiltration (MF). This symposium focuses primarily on fundamental and applied research on the application of pressure-driven membrane processes in water and wastewater treatment. Specifically, fundamental studies on membrane fouling are first presented. They include (i) effect of membrane properties on membrane fouling, (ii) membrane synthesis and modifications for fouling minimization, (iii) membrane fouling and selectivity and (iv) colloidal fouling assessment. The second half of the symposium deals with various applied research on membrane processes for water and wastewater treatment. Examples are (i) UF/RO hybrid process for industrial wastewater treatment, (ii) integration of membrane processes into conventional water treatment, (iii) effect of chloramination on membrane integrity and (iv) backwashing efficiency of MF/UF processes.

SEUNGKWAN (S. K.) HONG is an assistant professor in the Department of Civil and Environmental Engineering at University of Central Florida (UCF). He received both B.S. and M.S. degrees in Civil Engineering from the University of California, Irvine and earned his Ph.D. degree in Civil Engineering from the University of California, Los Angeles. His Ph.D. work focused on fundamental understanding of membrane fouling. His expertise involves the development and application of membrane processes for water and wastewater treatment. Since he joined UCF as a faculty member in 1997, he has conducted various research projects related to membrane processes. He has presented his work at various domestic and international conferences, and published numerous papers in refereed journals and conference proceedings. Examples of his active research projects include (i) distribution system blending of treated surface, ground and saline sources, (ii) surface water treatment by membrane processes, (iii) particle fouling in membrane filtration, (iii) UF capillary membrane for wastewater reclamation and (iv) development of fouling resistant RO and NF membranes. Currently, he is a chair of AWWA membrane research technology committee.

NEW ANALYTICAL TECHNIQUES FOR DISSOLVED ORGANIC MATTER

Dissolved organic matter is a complex mixture of organic compounds. Processes involving dissolved organic matter have been studied in the past for its binding and complexation properties, formation of disinfection by-products, mobilization of metals and anthropogenic contaminants and compositional differences due to various environmental sources. Analytical techniques developed recently are being applied to analysis of dissolved organic matter in order to better understand how variations in composition affect its behavior in these processes. This symposium will showcase new

applications or analytical techniques for the investigation of natural organic matter.

COLLEEN ROSTAD has worked for the Water Resources Discipline of the U.S. Geological Survey for over 20 years as a Research Chemist. She received her Ph.D. in Applied Organic Chemistry from the Colorado School of Mines, on partitioning of toxic organic compounds in particulate, colloid and dissolved phases of the Mississippi River. Her interests include application of mass spectrometry to transport and fate of toxic organic compounds in surface and groundwater systems. Recently her studies have included fate in wastewater and groundwater recharge studies, including disinfection by-products and steroidal hormones.

CORDELIA HWANG is a Senior Chemist on the chemistry development team at the Metropolitan Water District of Southern California and has been conducting research in the field of environmental chemistry for over 25 years. She received her B.S. degree from Columbia University and her M.S. in Chemistry from the State University of New York at Stony Brook. Her research has focused on the study of natural organic matter, disinfection by-products and synthetic organic contaminants in drinking water. She has developed analytical methods utilizing advanced concentration, derivatization, chromatographic and mass spectral techniques and applied them to water supply, treatment and distribution systems. She has received funding from the U.S. Environmental Protection Agency and the American Water Works Research Foundation and is a member of the American Chemical Society, American Water Works Association and the American Society for Mass Spectrometry.

THE SCIENCE AND POLICY OF TOPICAL ANTIMICROBIAL AGENTS

Antimicrobial agents are used in many consumer products and sometimes appear in wastewater effluents. Because of widespread use, there has been increased evaluation of their efficacy in suppressing microbial growth or killing microbes as well as their potential fate and transformation after use. This symposium will look at several antimicrobial agents, how they are used and what happens to them afterwards.

EDWARD T. URBANSKY joined the Water Supply and Water Resources Division of the EPA's National Risk Management Research Laboratory in July 1997. Although he is an inorganic chemist, much of his work at the EPA has dealt with disinfection by-product measurement in chlorinated or ozonated drinking water. He has also been involved in work on the perchlorate anion as an environmental contaminant. Author or coauthor of 35 peer-reviewed publications and editor of a book, *Perchlorate in the Environment*, he also serves on the Editorial Board of the *Journal of Environmental Management* and the Advisory Board of the *Journal of Environmental Monitoring*. He attended Allegheny College and Purdue University.

**ACS AWARD FOR CREATIVE ADVANCES
IN ENVIRONMENTAL SCIENCE AND TECHNOLOGY:
HONORING DR. ROGER ATKINSON**

(Sponsored by Air Products and Chemicals, Inc.)

The symposium deals with the chemical reactions occurring in the troposphere, and includes presentations on the kinetics of both the initiating reactions (OH radicals and Cl atoms) and of key intermediate species involved in the organic degradation reactions (peroxy and alkoxy radicals); on products and mechanisms of organic photo-oxidations; on the pathways leading to aerosol formation; and on ambient atmospheric measurements of selected species.

Dr. Atkinson was nominated for his immense contributions to research on the kinetics, mechanisms and products of gas-phase reactions of organic compounds in the atmosphere and for his role in the evaluation and presentation of the large body of existing data for effective use by both the research community and groups which advise the government and industry on scientific and technical matters concerning air pollution.

Dr. Roger Atkinson is currently the Director of the Air Pollution Research Center, a Professor of Atmospheric Chemistry in the Department of Environmental Sciences and a Cooperating Faculty Member in the Department of Chemistry at the University of California, Riverside. During the early part of his career in the 1970s, Dr. Atkinson's research dealt with elementary gas-phase reactions of atmospheric importance, *i.e.* ozone-, O(³P) atom-, O(¹D) atom- and OH radical reactions with atmospherically relevant organic and inorganic reactants. Beginning in the late 1970s, while vigorously pursuing reaction rate constant measurements for OH radical, ozone and NO₃ radical, his research increasingly placed emphasis on products and mechanisms of the gas-phase reactions of the classes of compounds that find their way into the atmosphere, from both anthropogenic and biogenic sources. Apart from his ongoing research on alkanes, alkenes and simple aromatics, his contributions toward establishing the intricate framework of tropospheric organic chemistry include studies on polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), hydrofluorocarbons (HFCs) and hydrochlorofluorocarbons (HCFCs), selected pesticides and biogenic hydrocarbons, such as isoprene and the monoterpenes. He has combined the use of environmental chambers with advances in analytical instrumentation and techniques to study these reactions in great detail. His recent development of methods to detect hard-to-analyze organic photooxidation products, such as hydroxycarbonyls and hydroxyalkylnitrates, by atmospheric pressure ionization mass spectrometry is particularly noteworthy. His studies of the transformations of PAHs and biogenic emissions include field measurements which are painstakingly reconciled with the dynamics of products observed in laboratory chamber reactions.

Dr. Atkinson is the author of the most widely used method for estimating OH radical reaction rate constants for organic compounds which is based on structure-reactivity

relationships (Nos. 141, 165, 177, and 266 *List of Publications*). It has been successful in providing good agreement (generally to within a factor of 2) between experimentally measured and calculated room temperature rate constants for ca. 90% of approximately 485 compounds. This predictive tool has been put to practical use extensively by industry groups in the selection and development of more environmentally friendly chemical products. This estimation method is the basis of the Syracuse Research Corporation's "Atmospheric Oxidation Program" [see Meylan and Howard, *Chemosphere* **26**: 2293-2299 (1993)]. Dr. Atkinson has a passion for continuously updating essential data and his latest update of this method appears in a chapter of a forthcoming book ("*Estimating Chemical Properties for Environmental and Health Sciences: A Handbook of Methods*", Eds. D. Mackay and R. S. Boethling, Ann Arbor Press, in press).

The field of atmospheric chemistry is far less confusing to students and researchers alike because of Dr. Atkinson's conscientious effort to compile and provide evaluation of the large body of (sometimes significantly disagreeing) data on the kinetics and mechanisms of tropospheric organic reactions. In 1984, he co-authored his first attempt at a systematic compilation of these data in a review of the gas-phase reactions of ozone with organic compounds. A similar review on hydroxyl radical reactions followed which he expanded in 1989 into a more comprehensive monograph. A second monograph entitled "Gas-Phase Tropospheric Chemistry of Organic Compounds" published in 1994 is an updated volume which encompass data for hydroxyl radical-, nitrate radical- and ozone reactions. Collectively, they are perhaps the most widely used source of quantitative information by the practicing atmospheric chemist. A significant portion of data contained in these monographs comes from Dr. Atkinson's own research. Dr. Atkinson is also a member of an IUPAC Subcommittee that regularly updates and publishes evaluated kinetic and photochemical data for atmospheric chemistry.

Dr. Atkinson's impact on the field of atmospheric chemistry goes beyond his original research and creative writings. He is a prolific reviewer as well of journal articles and extramural reports and proposals. He has been an active speaker at university seminars and academic meetings and has been a much sought member and participant in committees and panels at the state, national and international level. He currently serves in the California Air Resources Board's (ARB) Reactivity Scientific Advisory Committee and the California Environmental Protection Agency, ARB, Scientific Review Panel on Toxic Air Contaminants. He was a member of two National Research Council committees that dealt with the complex issues of "Tropospheric Ozone Formation and Measurement" and "Ozone-Forming Potential of Reformulated Gasoline" and had major contributions to two refereed books of the above titles. He is continually active in carrying out critical review and evaluation efforts as a member of the Coordinating Council, Inc., Review Panel on the Atmospheric Chemistry of Hydrocarbons and of the IUPAC Subcommittee on Gas Kinetic Data Evaluation for Atmospheric Chemistry.

Dr. Atkinson's creative influence and standing in the field is further summarized by a

recent comment from an eminent atmospheric chemist, which I paraphrase: "He has demonstrated over the years the ability to design experiments to test various hypotheses related to the chemical mechanisms operative in the atmosphere. His contribution to the development of useful tools related to the modeling of this chemistry has been very significant. There is not a chemical module in use today in many atmospheric modeling groups around the World which does not contain key elements which were discovered and published by Dr. Atkinson."

ROGER ATKINSON obtained a B.A. in Natural Sciences and a Ph.D. in Physical Chemistry from the University of Cambridge, UK, and is presently Distinguished Professor of Atmospheric Chemistry and Director of the Air Pollution Research Center at the University of California at Riverside. His research interests include kinetic, product and mechanistic studies of the gas-phase reactions of organic compounds with OH and NO₃ radicals and O₃. He is also involved in the review and evaluation of kinetic and mechanistic data for atmospheric chemistry.

RUTH A. HATHAWAY serves as the Business Office Manager for the Division of Environmental Chemistry of the American Chemical Society. Mrs. Hathaway is a consultant with Hathaway Consulting and a part time instructor in the Department of Chemistry at Southeast Missouri State University. Prior to her consulting work, she was the quality control/quality assurance director for an environmental lab and the laboratory director for a transformer manufacturer. She received her B.S. in Chemistry from Huntington College and did graduate work in Medicinal Chemistry at Purdue University. She is an active member of the Division of Environmental Chemistry. She serves on the ACS Divisional Activities Committee and the Board for the National Registry for Certified Chemists.

MERCURY IN THE ENVIRONMENT: ASSESSING AND MANAGING THE MULTIMEDIA RISKS

The symposium will focus on all aspects of mercury and its environmentally important compounds as an environmental pollutant. Papers on source identification, source control, fate, transport, distribution, remediation, analytical chemistry, bioconcentration and toxicology will be presented.

WILLIAM G. STELZ is a Senior Environmental Scientist in the U.S. Environmental Protection Agency (EPA) Office of Research and Development, National Center for Environmental Research, where he is currently Acting Assistant Center Director for research planning and coordination activities for Multi-media research and Acting Deputy Division Director, Environmental Science Research Division. He also is the NCER lead for mercury research, and is involved in several aspects of ecological research issues. He serves as Project Officer for research grants in the following areas: mercury, ecological research, water and watersheds, fate and transport of hazardous

wastes, air, and others as well as Project Officer for two National Centers of Excellence in air toxics and wetlands restoration. Mr. Stelz has worked in several program areas at EPA, including Water, RCRA/CERCLA Enforcement, and The Office of Research & Development. He has worked at EPA Headquarters in Washington DC, and EPA Region II in New York.

Prior to joining EPA, Mr. Stelz worked for the U.S. Geological Survey as a Research Groundwater Hydrologist throughout New York State. He holds a B.S. and an M.S. in Geology and is a Certified Professional Geologist. He has been an Invited Lecturer and Instructor with the University of Wisconsin-Madison College of Engineering Department of Engineering Professional Development, teaching the course "Subsurface Investigations and Remediations for Hazardous Waste Sites" from 1990-1995. Mr. Stelz has received awards from EPA for Commendable Service, including several bronze metals and he is also a recognized National Expert for EPA in the application Federal Groundwater Monitoring Regulations and Groundwater Protection Programs.

THOMAS ATKESON - no bio received prior to publication

ALLAN M. FORD is the former Director of Monsanto Company's Environmental Sciences Center and former Director to the Texas Hazardous Waste Research Center and the Gulf Coast Hazardous Substance Research Center. He is past editor of the journal *Waste Management*. He is past chair of the American Chemical Society's Committee on Environmental Improvement. He is past chair of the ACS Task Force on Indoor Air Pollution and the Presidential Task Force on Credentialing. He is chair of the ACS Task Force on Environmental Research Funding which supports Federal funding of environmental research. He was an organizer of the EPA/ACS Green Chemistry Awards program and chair of the programs peer review panel. Dr. Ford earned his B.S. from Iowa State University and his Ph. D. from Kansas State University. Dr. Ford is chair of the American Chemical Society's Division of Environmental Chemistry.

JONATHAN G. HERRMANN was made the Acting Director of NCEA's Cincinnati Division on October 1, 2001. He began his career in 1975 at EPA's Region VIII Office and then came to ORD in 1978. Jon worked in the private sector for a short time in the early 1980s and then returned to EPA in 1982. Since 1995, he has served as the National Risk Management Research Laboratory's (NRMRL's) Assistant Laboratory Director for Multimedia Programs. In that role, Jon addressed strategic planning and program development issues related to ORD's Sound Science Goal (Goal 8). He was responsible for NRMRL's core research programs related to human health, ecosystem protection, emerging risks and pollution prevention and new technology. Jon holds a B.S. Degree in Civil Engineering and a M.S. Degree in Business Administration. He is a member of the American Society of Civil Engineers and a Diplomate in the American Academy of Environmental Engineers. He is a licensed Professional Engineer in the State of Ohio. One of Jon's most recent work-related accomplishments involved co-leading a cross-Agency team in preparing EPA's Mercury Research Strategy,

published in December 2000. More recently, he led a cross-ORD team in the development of the Public Health Outcomes Chapter of ORD's Human Health Research Strategy. He has also been working with NRMRL colleagues and the Inspector General in testing the IG's Program Evaluation Model on Goal 8.4 (Pollution Prevention and New Technology).

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