Curriculum Vitae of

WILLIAM H. STARNES, JR.

Contents

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Curriculum Vitae of

WILLIAM H. STARNES, JR.

EDUCATION

Ph. D. in Organic Chemistry, Georgia Institute of Technology (1960).
B. S. in Chemistry (Honors), Virginia Polytechnic Institute (1955).
Union College, KY (1950-1952).

EXPERIENCE

College of William and Mary, Williamsburg, VA (1989-).
Floyd Dewey Gottwald, Sr., Professor of Chemistry (Virginia Eminent Scholar Chair), 1989-2006 (*Emeritus*, 2006-); *Professor of Applied Science*, 1990-2006.

Polytechnic University, Brooklyn, NY (1985-1989).
Professor of Chemistry, 1985-1989; Associate Director, Polymer Durability Center, 1987-1989; Head, Department of Chemistry and Life Sciences, 1985-1988.

AT&T Bell Laboratories, Murray Hill, NJ (1973-1985).
Distinguished Member of Technical Staff, 1982-1985; Supervisory Member of Technical Staff, 1973-1982.

Department of Chemistry, University of Texas, Austin, TX (1971-1973).
Instructor, Research Associate.

Esso Research and Engineering Company, Baytown, TX (1960-1971).
Research Associate, 1967-1971; Research Specialist, 1965-1967; Head, Polymer Additives Section, 1964; Senior Research Chemist, 1962-1964; Research Chemist, 1960-1962.

MISCELLANY

Some 530 publications, patents, and presentations.

Courses taught at the College of William and Mary, Polytechnic University, and the University of Texas at Austin:
Polymer Science I
Polymer Degradation and Stabilization
Advanced Organic Chemistry I & II
Introductory Organic Chemistry I & II
Introductory Organic Chemistry for nonmajors
Organic Chemistry Laboratory I & II

Invited presentation (made *in absentia*) of the inaugural William Starnes Fellowships for Excellence in Research, Georgia Institute of Technology, School of Chemistry and Biochemistry, Atlanta, GA, April 7, 2017.

Co-Editor, *How Will You Measure Life? Inspirational Talks and Prayers of W. H. Starnes, Sr.*, S. M. Starnes and W. H. Starnes, Jr., Eds.; Cedar Creek Publishing, Bremo Bluff, Virginia, 2015.

Editor-in-Chief, *Journal of Vinyl and Additive Technology* (1998-2014).

Member, Technical Program Committee, Global Conference on Polymer and Composite Materials, Ningbo, China (2014).

Master of Ceremonies, Dedication Ceremony for Virginia Historical Highway Marker Z-292 titled *William H. Starnes: Agricultural Educator*, Ewing, Virginia, May 27, 2014.

Member, International Advisory Board, HPI-FAPS International Conference on Innovation in Polymer Science and Technology, Yogyakarta, Indonesia (2013).

Guest Editor, *Proceedings, Innovation in Polymer Science and Technology 2011, Procedia Chemistry*, **4** (2012).

Member, International Advisory Committee, International Conference on Innovation in Polymer Science and Technology, Bali, Indonesia (2011).

Chair, Sessions on Nanomaterials and Additive Dispersion Technology, 14th International Conference on Plastics Additives and Compounding, Barcelona, Spain, October 15, 2008.

Member, International Scientific Committee, Symposium on Polymer Blends and Composites, European Materials Research Society Fall Meeting, Krakow, Poland (2002).

Chair, Session on Aging, Irradiation, and Stabilization, 2nd International Conference on Polymer Modification, Degradation, and Stabilization, Budapest, Hungary (2002).

Judge, poster presentations, 2nd International Conference on Polymer Modification, Degradation, and Stabilization, Budapest, Hungary (2002).

Organizer and Chair, International Symposium on "PVC and Related Polymers: Chemistry and Applications", 222nd National Meeting of the American Chemical Society, Chicago, IL (2001).

Chair, Opening Plenary Session, 8th European Conference on Fire Retardant Polymers, Alessandria, Italy (2001).

Member, Thesis Awards Committee, Society of Plastics Engineers, Vinyl Plastics Division (1999-).

Charter member, Department of Chemistry Advisory Council, Virginia Tech (1998-).

Member, National Publications Committee, Society of Plastics Engineers (1998-2001).

Member, Vinyl Plastics Division Board, Society of Plastics Engineers (1998-2014).

Member, Vinyl Institute Technical Committee Task Group (1997).

Distinguished Visiting Professor, Beijing Institute of Technology, Beijing, China, October 12-19, 1996.

Scientific Advisor, European Multinational Environmental Research Project on PVC in Soil and Landfills (1995-1999).

Organizer, Director, and principal Instructor, Continuing Education courses on chlorinated polymers at Norsk Hydro, Porsgrunn, Norway (1998); Akzo Nobel, Dobbs Ferry, NY (1996); Union Carbide, Bound Brook, NJ (1996); William and Mary (1995, 1993).

Co-Organizer and Co-Instructor, "Poly(vinyl chloride): Recent Developments and Future Trends", Continuing Studies course, University of Toronto, Toronto, Canada (1990).

Co-Organizer and Presider, Symposium on Polymer Degradation and Stabilization, Polytechnic University, Brooklyn, NY (1989).

Official Guest, Russian Academy of Sciences (1992); USSR Academy of Sciences (1990).

Wall Street Journal Opinion Leader Panelist (1995-).

Review Panelist, NSF Academic Research Facilities Modernization Program: Phase II (1990).

Review Panelist, NSF Small Business Innovative Research Program: Phase I (1989).

Chair, Chemistry Subpanel, and Member, Panel on Physical Sciences and Engineering, Project 2061 of the American Association for the Advancement of Science (1985-1986).

Member, Editorial Review Board, *The Chemist* (2003-2011).

Member, Board of Reviewing Editors, *International Journal of Coatings Science* (2001-).

Member, Advisory Board, *Encyclopedia of Vinyl and Additive Technology* (2000-).

Member, Editorial Board, *Polymer Degradation and Stability* (1997-).

Member, Editorial Board, *Journal of Chemical and Biochemical Kinetics* (1992-).

Member, Advisory Board and Board of Reviewers, *Journal of Vinyl Technology* (1981-1983).

Acting Director, William and Mary Applied Science Program (summer, 1991).

Organizer and Coordinator, exhibit booth for the William and Mary Applied Science Program, Southeastern Regional Meeting of the American Chemical Society, Richmond, VA (1991).

Organizer and Coordinator, Center for the History of Chemistry exhibit on "Polymers and People: An Informal History", Zollinger Museum, College of William and Mary, Williamsburg, VA (1991).

Organizer and Coordinator, reception and public lecture by F. H. Winslow on "The History of Polyethylene", Botetourt Theater, College of William and Mary, Williamsburg, VA (1991).

Mentor, Ph. D. Channel Program, Faculty of Science, University of Cairo, Cairo, Egypt (1994-1995).

External thesis examiner for McMaster University, Canada (1994); MacQuarie University, Australia (1991); McGill University, Canada (1989); Indian Institute of Technology, India (1988).

American Chemical Society (Member, 1954-):
Executive Committee Member-At-Large, Virginia Section (1995).
Local Meeting Organizer, Virginia Section (1995).
Speakers Bureau, Division of Polymer Chemistry (1976-).
Consultant, Books Department.
Consultant, Tour Speaker Service.
Southeastern Texas (Houston) Section:
Board of Directors (1970);
Operation Interface Organizing Committee (1970);
Operation Interface Industrial Representative (1969, 1970);
Awards and Nominations Committee [1967-1969; created the annual Southeastern Texas Section Award (later called the Greater Houston Section Award) while serving as Chair, 1969];
Local Officers Nominating Committee (1967);
Chemical Education Committee (1962).

Other memberships: Virginia Academy of Science, Materials Research Society, North American Thermal Analysis Society, Society of Chemical Industry.

Chair, Opening Plenary Session, International Conference on the Regulation of Polymeric Materials Stability, Moscow, Russia (1992).

Session Chair or Discussion Panel Member at numerous international, national, and regional technical conferences not mentioned above.

Invited Discussion Leader and Consultant, Gordon Research Conference on the Chemistry and Physics of Paper (1974).

Instructor, Petroleum Institute for Educators, University of Houston, Houston, TX (1968).

Visiting Scientist, Texas Academy of Sciences (1964-1967).

Research sponsors (1986-):

Amoco Chemical Co.
B. F. Goodrich Co.
Colorite Polymers Co.
Dow Chemical Co.
Edison Polymer Innovation Corp.
Egyptian Cultural and Educational Bureau
Elf Aquitaine, Inc. (*unrestricted*)
GenCorp Foundation (*unrestricted*)
Geon Co.
International Copper Association
Kleerdex Co.
National Bureau of Standards
National Science Foundation (Materials Research and Chemistry Divisions)
Occidental Chemical Corp.
Shell Development Co.
Sherwin-Williams Co.
Society of Plastics Engineers, Vinyl Plastics Division (4 unsolicited grants, *unrestricted*)
Stockhausen Louisiana, Ltd.
Stoler Industries
U. S. Department of Defense
U. S. Department of Energy (via Norfolk State University)
Virginia's Center for Innovative Technology

Consulting (1985-):

Albemarle Corp.
American Plastics Council
Ausimont USA, Inc.
B. F. Goodrich Co.
Canada Mortgage & Housing Corp.
Center for Research in Applied Chemistry (Mexico)
City of Tacoma, WA
Congoleum Corp.
Council of Canadian Academies
Crompton Corp.
Dow Chemical Co.
Edison Polymer Innovation Corp.
Ensurco Duradek, Ltd.
European Vinyls Corp.
Exxon Corp.
Ferro Corp.
Finnegan, Henderson, *et al*.
Five Winds International
GenCorp, Inc.
Geon Co.
Governo & Kavanagh
Hampton University
Hancock, Rothert & Bunshoft
Hanser Publishers
Herbert Smith (law firm, London, U.K.)
Johns Manville Corp.
John Wiley & Sons
Lubrizol Advanced Materials
M&T Chemicals
Occidental Chemical Corp.
OPI Products, Inc.
Prentice-Hall, Inc.
Research Frontiers, Inc.
Responsible Consumer Products
Revenue Canada (Canadian Customs Bureau)
Rohm and Haas Co.
Sachem, Inc.
Shell Development Co.
Stockhausen Louisiana, Ltd.
Stutes & Lavergne
Texas Commission on Environmental Quality
Townsend Polymer Services
Trim-Lok, Inc.
Union Carbide Corp.
U. S. Consumer Product Safety Commission
Vinyl Institute
Viskase Corp.

HONORS

- INTERNATIONAL

Honoree, Plastics History and Artifacts Program, Plastics Pioneers Association (2001)
[*named one of fewer than a thousand individuals worldwide who have had the greatest impact on the history of plastics*]

Fellow, Society of Plastics Engineers (2001)
[*for "…his outstanding, long-term contribution to the industry"*]

Fellow, New York Academy of Sciences (1997)
[*for "...landmark contributions in the field of polymer chemistry, most notably in the area of polymer aging and degradation. ...Polymer chemists are unanimous in assessing his work on poly(vinyl chloride) as the standard in the field."*]

Commission, Honorable Order of Kentucky Colonels (2009)
[*awarded by Kentucky Governor Steven Beshear for "strength of character, leadership, and dedication to the welfare of others"*]

Biographical sketch, "William H. Starnes, Jr.: 45 Years in Science", in "Polymers in Europe", *Polymer News*, **25**, 239 (2000)

Polymer Science Pioneer profile in *Polymer News*, **13**, 282 (1988)
[*for "...research on the structure, stability, and polymerization mechanism of PVC and on the mechanisms of its degradation. ...sophisticated investigations, such as those carried out by Dr. Starnes, ...will ensure the future growth and utility of PVC."*]

Biographical profiles[*] in:

Who's Who in Finance and Business (2004-2005)
Who's Who in the World (1987/1988)
Who's Who in Science and Engineering (1992/1993)
Who's Who in Frontiers of Science and Technology (1985)
Who's Who in Finance and Industry (1989/1990)
International Who's Who of Contemporary Achievement (1984)
Men and Women of Distinction (1980)
Men of Achievement (1975)
Dictionary of International Biography (1969/1970)

- NATIONAL

Chemical Pioneer Award, American Institute of Chemists (2019)
[*lifetime achievement award "for significant contributions to basic and applied chemistry, and for the advancement of the science and technology of vinyl plastics"*]

Honoree, gift presented to the Rutgers University Department of Chemistry by G. M. Villacorta (2019)

Interviewee, Virginia Tech Oral History Project (*vtstories.org*) (2018)
[*first History Project honoree associated with the Virginia Tech Department of Chemistry*]

Hall of Distinction, Virginia Tech College of Science (2013)
[*inaugural honoree; the only chemist selected*]

Outstanding Alumnus, Georgia Institute of Technology School of Chemistry and Biochemistry (2012)
[*inaugural honoree*]

[*] Dates are years of first publication.

D.Sc. (*honoris causa*), Union College, Kentucky (2013)

Fellow, American Association for the Advancement of Science (1975)
[*for "...a significant contribution to the body of knowledge about organic chemistry in general and about free radical chemistry with special emphasis on its relationship to the properties and stabilities of polymers"*]

Life Fellow (1977) **and Fellow** (1973), **American Institute of Chemists**
[*for "...experience in the practice of the profession of chemist..."*]

Distinguished Alumni Scholar, Union College, Kentucky (2009)
[*for "outstanding achievement in scientific excellence"*]

Roy T. Gottesman Leadership Award, Vinyl Institute (2016)
[*lifetime achievement award for "outstanding contributions to the vinyl industry"*]

Elliott Weinberg Vinyl Communications Award, Society of Plastics Engineers, Vinyl Plastics Division (2011); **co-winner with former student Dr. X. Ge** (2014)
[*lifetime achievement award for vinyl research in academia and dissemination of its results*]

Technical Contributions to Vinyl Award, Society of Plastics Engineers, Vinyl Plastics Division (2009)
[*lifetime achievement award for "outstanding technical contributions that have advanced vinyl technology"*]

ANTEC Best Technical Paper Award, Society of Plastics Engineers, Vinyl Plastics Division (2011)
[*for authorship of the paper awarded First Prize*]

Senior author, ANTEC Best Paper Award, Society of Plastics Engineers, Vinyl Plastics Division (2009)
[*for coauthorship of the paper awarded First Prize*]

Mentor, ANTEC Best Student Paper Award, Society of Plastics Engineers, Vinyl Plastics Division (2007)
[*for mentorship of the student paper awarded First Prize*]

Thesis Advisor Awards, Society of Plastics Engineers, Vinyl Plastics Division (1998, 1996)
[*for mentorship of the Ph. D. dissertations awarded First Prize*]

Ranked among the top 3% of American chemists in the Chambers Nationwide Survey of Scientific Creativity (1970)

Predoctoral Fellow, National Science Foundation (1958–1960)

Biographical profiles[*] in:

Who's Who in America (1988/1989)
Who's Who in American Education (1992/1993)
Directory of Distinguished Americans (1981)
Notable Americans (1976/1977)
Personalities of America (1981)
Community Leaders of America (1972)
American Registry Series (1980)
American Men and Women of Science (1965?)

[*] Dates are years of first publication.

- REGIONAL

Charter inductee, Southwest Virginia Walk of Fame (2008)
[*The Walk of Fame honors "…great Southwest Virginians…who have made significant contributions to our state, nation, and world"*.]

Excellence in Innovation Award, Hampton Roads Technology Council, Virginia (2004)
[*for invention of the Ester Thiol technology for poly(vinyl chloride) stabilization*]

38th Annual Honor Scroll Award, American Institute of Chemists (New Jersey) (1989)
[*"...in recognition of his unique and innovative contributions to the understanding of materials, particularly polymers and especially poly(vinyl chloride); his leadership of multinational groups and interaction with international researchers and teachers; his strong advocacy of break-through concepts; his professional record as researcher, manager, and teacher..."*]

Biographical profiles[*] in:

Who's Who in the East (1989/1990)
Who's Who in the South and Southwest (1971/1972)
Personalities of the South (1972)

- LOCAL

Distinguished Technical Staff Award, Bell Laboratories, Murray Hill, New Jersey (1982)
[*for "...fundamental studies on the degradation of poly(vinyl chloride)...the general understanding of the uses of stabilizers...a skilled use of modern chemical methods to give a very clear picture of the detailed mechanisms by which the polymer is formed during polymerization and...new clarity to our understanding of the abnormalities in its structure"*]

Annual Professional Progress Award, Society of Professional Chemists and Engineers, Baytown, Texas (1968)
[*for outstanding technical achievements in science or engineering*]

M. A. Ferst Award, Society of the Sigma Xi, **Georgia Institute of Technology Chapter**, Atlanta, Georgia (1960)
[*annual award for the best Ph. D. dissertation (from all disciplines) at Georgia Tech*]

Guest of Honor, Dedication Ceremony for the William H. Starnes Athletic Complex of Thomas Walker High School, Ewing, Virginia (2015)

Member, Sigma Xi [*honorary research society* (1957)], **Phi Lambda Upsilon** [*honorary chemical society* (1953); President, Virginia Tech Chapter (1954-1955)], **Phi Kappa Phi** [*scholastic honor society* (1955); Life Member (2001)]

[*] Dates are years of first publication.

RESEARCH PAPERS

"Homolytic Decarboxylation: A Novel Technique for Generating Free Aryl Radicals in Solution", W. H. Starnes, Jr., *Journal of the American Chemical Society*, **84**, 2270 (1962).

"Thermal Decomposition of *t*-Butyl 3,3,3-Triarylperpropionates. Evidence for the Intramolecular Rearrangement and Cyclization of Aliphatic Acyloxy Radicals", W. H. Starnes, Jr., *Journal of the American Chemical Society*, **85**, 3708 (1963).

"Concurrent Carbon-to-Oxygen Rearrangement, Cyclization, and Decarboxylation in the Reaction of 3,3,3-Triarylpropionic Acids with Lead Tetraacetate", W. H. Starnes, Jr., *Journal of the American Chemical Society*, **86**, 5603 (1964).

"Homolytic Autoxidative Decarboxylation of Aromatic Acids", W. H. Starnes, Jr., *Journal of Organic Chemistry*, **31**, 1436 (1966).

"Acid-Catalyzed Decomposition of Peroxydienones Derived from Hindered Phenols", W. H. Starnes, Jr., *Journal of Organic Chemistry*, **31**, 3164 (1966).

"The Reaction of Triphenylphosphine with Peroxycyclohexadienones", W. H. Starnes, Jr., and N. P. Neureiter, *Journal of Organic Chemistry*, **32**, 333 (1967).

"Mechanism of the Oxidation of Monohydric Alcohols with Lead Tetraacetate. Rearrangement in the Triarylmethanol Series", W. H. Starnes, Jr., *Journal of the American Chemical Society*, **89**, 3368 (1967).

"The Reaction of Triarylmethanols with Lead Tetraacetate. Mechanism of the Lead Tetraacetate Oxidation of Monohydric Alcohols", W. H. Starnes, Jr., *Journal of the American Chemical Society*, **90**, 1807 (1968).

"Lead Tetraacetate Oxidation of 4,4,4-Triphenyl-1-butanol, 3,3,3-Triphenyl-1-propanol, and 4,4,4-Triphenylbutyric Acid", W. H. Starnes, Jr., *Journal of Organic Chemistry*, **33**, 2767 (1968).

"A Cyclobutenone from Photolysis of a Cyclohexa-2,5-dienone", D. A. Plank, J. C. Floyd, and W. H. Starnes, Jr., *Chemical Communications*, 1003 (1969).

"2,4,6-Tri-*t*-butylresorcinol and Its Diketo-Tautomer from Thermolysis of a 3-Hydroxy-4-vinylcyclobut-2-enone", J. C. Floyd, D. A. Plank, and W. H. Starnes, Jr., *Chemical Communications*, 1237 (1969).

"Reaction of a Quinone Methide with Triethyl Phosphite", W. H. Starnes, Jr., J. A. Myers, and J. J. Lauff, *Journal of Organic Chemistry*, **34**, 3404 (1969).

"Novel Dimeric Products from 10-Methyleneanthrone", W. H. Starnes, Jr., *Journal of Organic Chemistry*, **35**, 1974 (1970).

"Reaction of a Quinone Methide with Tri-*n*-butylphosphine", W. H. Starnes, Jr., and J. J. Lauff, *Journal of Organic Chemistry*, **35**, 1978 (1970).

"Fragmentation of Some Trityl Compounds by Means of Hydride Transfer. A Reinvestigation of an Unusual Reaction Reported by Gomberg", W. H. Starnes, Jr., *Journal of Organic Chemistry*, **36**, 2508 (1971).

"Unusual Antioxidant Behavior of Hindered Chlorophenols in Metal-Containing Systems", W. H. Starnes, Jr., *Tetrahedron Letters*, 3743 (1972).

"Some Aspects of Concerted Reactions in Organometallic Systems", R. Pettit, J. S. McKennis, W. Slegeir, W. H. Starnes, Jr., T. Devon, R. Case, J. C. Wagnon, L. Brener, and J. Wristers, *Annals of the New York Academy of Sciences*, **239**, 22 (1974).

"Oxidative Decarbonylation of 2,4,6-Tri-*tert*-butylresorcinol via a Probable *m*-Quinone Intermediate", W. H. Starnes, Jr., D. A. Plank, and J. C. Floyd, *Journal of Organic Chemistry*, **40**, 1124 (1975).

"Identification of Branches in Poly(vinyl chloride) by Reduction with $LiAlD_4$", F. A. Bovey, K. B. Abbås, F. C. Schilling, and W. H. Starnes, Jr., *Macromolecules*, **8**, 437 (1975).

"Chemical Stabilization of Poly(vinyl chloride) by Prior Reaction with an Organotin Mercaptide", W. H. Starnes, Jr., and I. M. Plitz, *Polymer Preprints, American Chemical Society, Division of Polymer Chemistry*, **16**(2), 500 (1975).

"Chemical Stabilization of Poly(vinyl chloride) by Prior Reaction with Di(*n*-butyl)tin Bis(*n*-dodecyl mercaptide)", W. H. Starnes, Jr., and I. M. Plitz, *Macromolecules*, **9**, 633, 878 (1976).

"New Aspects of the Chemical Stabilization of Poly(vinyl chloride) by Prior Reaction with Organotins", I. M. Plitz, W. H. Starnes, Jr., and R. L. Hartless, *Polymer Preprints, American Chemical Society, Division of Polymer Chemistry*, **17**(2), 495 (1976).

"Reductive Dehalogenation with Tri(*n*-butyl)tin Hydride: A Powerful New Technique for Use in Poly(vinyl chloride) Microstructure Investigations", W. H. Starnes, Jr., R. L. Hartless, F. C. Schilling, and F. A. Bovey, *Polymer Preprints, American Chemical Society, Division of Polymer Chemistry*, **18**(1), 499 (1977).

"Molecular Orbital Theory of Polyenes Implicated in the Dehydrochlorination of Poly(vinyl chloride)", R. C. Haddon and W. H. Starnes, Jr., *Polymer Preprints, American Chemical Society, Division of Polymer Chemistry*, **18**(1), 505 (1977).

"Solution Decomposition Behavior of Chemically Modified Poly(vinyl chloride)", I. M. Plitz, R. A. Willingham, and W. H. Starnes, Jr., *Macromolecules*, **10**, 499 (1977).

"The Reaction of Poly(vinyl chloride) with Thiols", W. H. Starnes, Jr., I. M. Plitz, D. C. Hische, D. J. Freed, F. C. Schilling, and M. L. Schilling, *Polymer Preprints, American Chemical Society, Division of Polymer Chemistry*, **19**(1), 623 (1978).

"Stabilization of Poly(vinyl chloride) by Thiols. A Mechanistic Study", W. H. Starnes, Jr., I. M. Plitz, D. C. Hische, D. J. Freed, F. C. Schilling, and M. L. Schilling, *Macromolecules*, **11**, 373 (1978).

"Functional-Group Selectivities in the Reduction of Poly(vinyl chloride) with Metallic Hydrides", W. H. Starnes, Jr., F. C. Schilling, I. M. Plitz, R. L. Hartless, and F. A. Bovey, *Polymer Preprints, American Chemical Society, Division of Polymer Chemistry*, **19**(2), 579 (1978).

"Reductive Dehalogenation with Tri-*n*-butyltin Hydride: A Powerful New Technique for Use in Poly(vinyl chloride) Microstructure Investigations", W. H. Starnes, Jr., R. L. Hartless, F. C. Schilling, and F. A. Bovey, *Advances in Chemistry Series*, **169**, 324 (1978).

"Molecular Orbital Theory of Polyenes Implicated in the Dehydrochlorination of Poly(vinyl chloride). II. Electronic Structures, Equilibrium Geometries, and Energetics of the Ground States of Polyenyl Cations and Neutral Polyenes", R. C. Haddon and W. H. Starnes, Jr., *Advances in Chemistry Series*, **169**, 333 (1978).

"Mechanism for the Formation of Chloromethyl Branches in Poly(vinyl chloride)", W. H. Starnes, Jr., F. C. Schilling, K. B. Abbås, R. E. Cais, and F. A. Bovey, *Polymer Preprints, American Chemical Society, Division of Polymer Chemistry*, **20**(1), 653 (1979).

"Structural Selectivities in the Reduction of Poly(vinyl chloride) with Lithium Aluminum Hydride and Tri-*n*-butyltin Hydride", W. H. Starnes, Jr., F. C. Schilling, K. B. Abbås, I. M. Plitz, R. L. Hartless, and F. A. Bovey, *Macromolecules*, **12**, 13 (1979).

"Calculated and Measured ^{13}C NMR Chemical Shifts of the 2,4,6-Trichloroheptanes and Their Implications for the ^{13}C NMR Spectra of Poly(vinyl chloride)", A. E. Tonelli, F. C. Schilling, W. H. Starnes, Jr., L. Shepherd, and I. M. Plitz, *Macromolecules*, **12**, 78 (1979).

"The Interaction of Hydrogen Sulfide with Lead- and Barium-Cadmium-Zinc-Stabilized Poly(vinyl chloride)", T. E. Graedel, J. P. Franey, W. H. Starnes, Jr., D. C. Hische, and P. C. Warren, *Journal of Applied Polymer Science*, **23**, 1769 (1979).

"Anomalous Behavior of Molybdenum Oxide as a Fire Retardant for Poly(vinyl chloride)", D. Edelson, V. J. Kuck, R. M. Lum, E. Scalco, W. H. Starnes, Jr., and S. Kaufman, *Preprints, Spring Technical Meeting, The Combustion Institute, Canadian Section*, 29-1 (1979).

"C-13 NMR Observations of Chain Branching in Vinyl Polymers", F. A. Bovey, F. C. Schilling, and W. H. Starnes, Jr., *Polymer Preprints, American Chemical Society, Division of Polymer Chemistry*, **20**(2), 160 (1979).

"Mechanism for the Formation of Chloromethyl Branches in Poly(vinyl chloride)", W. H. Starnes, Jr., F. C. Schilling, K. B. Abbås, R. E. Cais, and F. A. Bovey, *Macromolecules*, **12**, 556 (1979).

"Mechanistic Aspects of the Behavior of Molybdenum(VI) Oxide as a Fire-Retardant Additive for Poly(vinyl chloride)", W. H. Starnes, Jr., and D. Edelson, *ACS Organic Coatings and Plastics Chemistry*, **41**, 505 (1979).

"Mechanistic Aspects of the Behavior of Molybdenum(VI) Oxide as a Fire-Retardant Additive for Poly(vinyl chloride). An Interpretive Review", W. H. Starnes, Jr., and D. Edelson, *Macromolecules*, **12**, 797 (1979).

"PVC Flammability: An Investigation of PVC-Fire Retardant Interactions at the Molecular Level", R. M. Lum, L. Seibles, D. Edelson, and W. H. Starnes, Jr., *ACS Organic Coatings and Plastics Chemistry*, **43**, 176 (1980).

"A Novel Initiation Process for the Nonoxidative Thermal Dehydrochlorination of Poly(vinyl chloride): Apparent Intermediacy of a Cyclic Chloronium Ion", W. H. Starnes, Jr., R. C. Haddon, D. C. Hische, I. M. Plitz, C. L. Schosser, F. C. Schilling, and D. J. Freed, *Polymer Preprints, American Chemical Society, Division of Polymer Chemistry*, **21**(2), 138 (1980).

"Anomalous Behavior of Molybdenum Oxide as a Fire Retardant for Polyvinyl Chloride", D. Edelson, V. J. Kuck, R. M. Lum, E. Scalco, W. H. Starnes, Jr., and S. Kaufman, *Combustion and Flame*, **38**, 271 (1980).

"Recent Studies on PVC Using Carbon-13 NMR. Direct Structural Evidence for the Presence of Tertiary Chloride and for the Involvement of Free Chlorine Atoms in the Mechanism for Chain Transfer to Monomer during Vinyl Chloride Polymerization", W. H. Starnes, Jr., F. C. Schilling, I. M. Plitz, R. E. Cais, D. J. Freed, and F. A. Bovey, *Preprints, 3rd International Symposium on Poly(vinyl chloride)*, August, 1980, Cleveland, Ohio, p. 58.

"Short-Chain Branching in Polyethylene and Poly(vinyl chloride) Using Pyrolysis Hydrogenation Gas Chromatography and ^{13}C Nuclear Magnetic Resonance Analysis", S. A. Liebman, D. H. Ahlstrom, and W. H. Starnes, Jr., *Preprints, 3rd International Symposium on Poly(vinyl chloride)*, August, 1980, Cleveland, Ohio, p. 72.

"Structural and Dynamic Characterization of Polymers by ^{13}C and ^{19}F NMR", F. A. Bovey, R. E. Cais, L. W. Jelinski, F. C. Schilling, W. H. Starnes, Jr., and A. E. Tonelli, *Polymer Preprints, American Chemical Society, Division of Polymer Chemistry*, **22**(1), 268 (1981); *ACS Organic Coatings and Plastics Chemistry*, **44**, 553 (1981).

"Detailed Microstructure and Concentration of the Chlorinated *n*-Butyl Branches in Poly(vinyl chloride)", W. H. Starnes, Jr., F. C. Schilling, I. M. Plitz, R. E. Cais, and F. A. Bovey, *Polymer Bulletin (Berlin)*, **4**, 555 (1981).

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***** "Photodegradation of Poly(vinyl chloride): A Survey of Recent Studies", W. H. Starnes, Jr., presented in the International Symposium on Photodegradation, Photooxidation, and Photostabilization of Organic Coatings, 179th National Meeting of the American Chemical Society, Houston, Texas, March 27, 1980.

***** "Carbon-13 NMR Studies of the Molecular Structure of PVC and the Mechanism for Vinyl Chloride Polymerization", presented to the Northern New York Section of the American Chemical Society, Potsdam, New York, April 23, 1980.

"Recent Studies on PVC Using Carbon-13 NMR. Direct Structural Evidence for the Presence of Tertiary Chloride and for the Involvement of Free Chlorine Atoms in the Mechanism for Chain Transfer to Monomer during Vinyl Chloride Polymerization", W. H. Starnes, Jr., F. C. Schilling, I. M. Plitz, R. E. Cais, D. J. Freed, and F. A. Bovey, presented by WHS in a Plenary Session of the 3rd International Symposium on Poly(vinyl chloride), Cleveland, Ohio, August 11, 1980.

"Carbon-13 NMR Studies on the Microstructure of Poly(vinyl chloride) and the Mechanism of Vinyl Chloride Polymerization", F. C. Schilling, W. H. Starnes, Jr., and F. A. Bovey, presented by FCS in the NMR Symposium on Macromolecules, 22nd Rocky Mountain Conference, Denver, Colorado, August 12, 1980.

"Short-Chain Branching in Polyethylene and Poly(vinyl chloride) Using Pyrolysis Hydrogenation Gas Chromatography and ^{13}C Nuclear Magnetic Resonance Analysis", S. A. Liebman, D. H. Ahlstrom, and W. H. Starnes, Jr., presented by SAL in the 3rd International Symposium on Poly(vinyl chloride), Cleveland, Ohio, August 14, 1980.

"PVC Flammability: An Investigation of PVC-(Fire Retardant) Interactions at the Molecular Level", R. M. Lum, L. Seibles, D. Edelson, and W. H. Starnes, Jr., presented by RML at the 2nd Chemical Congress of the North American Continent (180th National Meeting of the American Chemical Society), Las Vegas, Nevada, August 25, 1980.

"A Novel Initiation Process for the Nonoxidative Thermal Dehydrochlorination of Poly(vinyl chloride): Apparent Intermediacy of a Cyclic Chloronium Ion", W. H. Starnes, Jr., R. C. Haddon, D. C. Hische, I. M. Plitz, C. L. Schosser, F. C. Schilling, and D. J. Freed, poster presentation by WHS and RCH at the 2nd Chemical Congress of the North American Continent, Las Vegas, Nevada, August 26, 1980.

"Structural and Dynamic Characterization of Polymers by ^{13}C and ^{19}F NMR", F. A. Bovey, R. E. Cais, L. W. Jelinski, F. C. Schilling, W. H. Starnes, Jr., and A. E. Tonelli, presented by FAB in the Symposium on Instrumental and Physical Characterization of Macromolecules, 181st National Meeting of the American Chemical Society, Atlanta, Georgia, March 31, 1981.

***** "Carbon-13 NMR Studies of Poly(vinyl chloride): New Information on Structural Defects and the Mechanism of Vinyl Chloride Polymerization", W. H. Starnes, Jr., F. C. Schilling, I. M. Plitz, R. E. Cais, F. A. Bovey, G. S. Park, and A. H. Saremi, presented by WHS in the Symposium on Nuclear Magnetic Resonance, 23rd Rocky Mountain Conference, Denver, Colorado, August 5, 1981.

"Formation of 1-Ethyl-2-(long alkyl)cyclopentane End Groups during Organotin Hydride Reductions of Poly(vinyl chloride)", W. H. Starnes, Jr., G. M. Villacorta, and F. C. Schilling, presented by GMV at the 182nd National Meeting of the American Chemical Society, New York, New York, August 26, 1981.

***** "Stabilization Against Thermal Degradation", presented at the ACS Polymer Division Topical Workshop on Maximizing Polymer Properties, White Sulphur Springs, West Virginia, November 23, 1981.

***** "Degradation and Stabilization of PVC", presented in the Plastics Institute of America Graduate Course on Degradation and Stabilization of Polymers, Newark, New Jersey, March 24, 1982.

***** "Mechanism of Poly(vinyl chloride) Fire Retardance by Molybdenum(VI) Oxide. Further Evidence in Favor of the Lewis Acid Theory", W. H. Starnes, Jr., L. D. Wescott, Jr., W. D. Reents, Jr., R. E. Cais, G. M. Villacorta, I. M. Plitz, and L. J. Anthony, presented by WHS in the International Symposium on Polymer Additives, 183rd National Meeting of the American Chemical Society, Las Vegas, Nevada, April 1, 1982.

***** "Recent Progress in the Elucidation of Poly(vinyl chloride) Microstructure Using Carbon-13 NMR", W. H. Starnes, Jr., presented in the Symposium on Polymer Characterization and Analysis by Chromatographic and Spectroscopic Methods, 16th Middle Atlantic Regional Meeting of the American Chemical Society, Newark, Delaware, April 22, 1982.

* "Mechanisms of Oxidation by Molecular Oxygen", presented at the Gordon Research Conference on Chemicals and Materials from Renewable Resources, New London, New Hampshire, July 7, 1982.

"Determination of the Labile Structural Defects in Poly(vinyl chloride) Using Carbon-13 NMR", W. H. Starnes, Jr., G. M. Villacorta, F. C. Schilling, and I. M. Plitz, presented by WHS in the IUPAC 28th Macromolecular Symposium, Amherst, Massachusetts, July 16, 1982.

"New Insights into the Flame-Retardance Chemistry of Poly(vinyl chloride)", D. Edelson, R. M. Lum, W. D. Reents, Jr., W. H. Starnes, Jr., and L. D. Wescott, Jr., presented by DE in the 19th International Symposium on Combustion, Haifa, Israel, August 10, 1982.

***** "Structure and Mechanism in the Chemistry of Poly(vinyl chloride)", presented to the Department of Chemistry, Virginia Commonwealth University, Richmond, Virginia, March 4, 1983.

***** "Recent Progress in the Chemistry of Poly(vinyl chloride)", presented to the Department of Chemistry, Virginia Polytechnic Institute & State University, Blacksburg, Virginia, March 7, 1983.

"Internal Double Bonds in Poly(vinyl chloride) and Cyclopolymerization during the Synthesis of Poly(vinyl chloride-*co*-1,3-butadiene)", W. H. Starnes, Jr., G. M. Villacorta, F. C. Schilling, G. S. Park, and A. H. Saremi, presented by WHS at the 185th National Meeting of the American Chemical Society, Seattle, Washington, March 24, 1983.

***** "Polymerization Chemistry and Chemical Stability of Poly(vinyl chloride)", presented at the D. S. Gilmore Research Laboratories of the Upjohn Company, North Haven, Connecticut, April 22, 1983.

***** "Poly(vinyl chloride) Degradation", presented at the Gordon Research Conference on Polymers, New London, New Hampshire, July 8, 1983.

"Pyrolysis of Poly(vinyl chloride)", W. D. Reents, Jr., W. H. Starnes, Jr., L. D. Wescott, Jr., R. E. Cais, G. M. Villacorta, I. M. Plitz, and L. J. Anthony, presented by WDR at the Gordon Research Conference on Analytical Pyrolysis, Plymouth, New Hampshire, July 13, 1983.

"Contribution of Carbonyl Structures to the Thermal Dehydrochlorination of Poly(vinyl chloride): Kinetic Studies on Low-Molecular-Weight Model Compounds", S. L. Haynie, G. M. Villacorta, I. M. Plitz, and W. H. Starnes, Jr., presented by SLH at the 186th National Meeting of the American Chemical Society, Washington, D. C., August 29, 1983.

***** "Structural and Mechanistic Aspects of the Thermal Degradation of Poly(vinyl chloride)", presented to the Department of Chemistry, University of New Hampshire, Durham, New Hampshire, September 27, 1983.

***** "Structural and Mechanistic Aspects of the Thermal Degradation of Poly(vinyl chloride)", presented to the Central Research & Development Department of E. I. du Pont de Nemours, Inc., Wilmington, Delaware, November 2, 1983.

***** "Mechanistic and Structural Features of the Thermal Degradation of Poly(vinyl chloride)", presented to the Department of Chemistry, University of Tennessee, Knoxville, Tennessee, January 3, 1984.

***** "Molecular Structure and Polymerization Mechanism of Poly(vinyl chloride-*co*-carbon monoxide)", L. D. Wescott, Jr., G. M. Villacorta, F. C. Schilling, I. M. Plitz, and W. H. Starnes, Jr., presented by WHS in the Symposium on Advances in Characterization of Polymers, 187th National Meeting of the American Chemical Society, St. Louis, Missouri, April 10, 1984.

***** "Current Mechanistic Aspects of the Degradation and Stabilization of Poly(vinyl chloride)", W. H. Starnes, Jr., S. L. Haynie, H. E. Katz, I. M. Plitz, and G. M. Villacorta, presented by WHS in the International Symposium on the Degradation and Stabilization of Polymers, 187th National Meeting of the American Chemical Society, St. Louis, Missouri, April 11, 1984.

***** "Stability of PVC: Chemical Aspects", presented in the Symposium on PVC, Mini-Tech Meeting of the Palisades Section of the Society of Plastics Engineers, Hoboken, New Jersey, April 25, 1984.

***** "Mechanisms of the Thermal Degradation and Stabilization of Poly(vinyl chloride): Some Recent Developments", W. H. Starnes, Jr., S. L. Haynie, H. E. Katz, I. M. Plitz, and G. M. Villacorta, presented by WHS in the Polymer Stabilization Symposium, 18th Middle Atlantic Regional Meeting of the American Chemical Society, Newark, New Jersey, May 21, 1984.

***** "Recent Studies of the Molecular Structure and Thermal Stability of Poly(vinyl chloride)", presented at the C.S.I.C. Institute of Plastics and Rubber, Madrid, Spain, June 15, 1984.

***** "Molecular Structure, Thermal Stability, and Thermal Stabilization of PVC", presented at the Research Laboratories of M&T Chemicals, Inc., Rahway, New Jersey, August 22, 1984.

"Poly(vinyl chloride) Structural Segments Derived from Azobis(isobutyronitrile)", W. H. Starnes, Jr., I. M. Plitz, F. C. Schilling, G. M. Villacorta, G. S. Park, and A. H. Saremi, presented by WHS at the 188th National Meeting of the American Chemical Society, Philadelphia, Pennsylvania, August 27, 1984.

"Mechanistic Studies on the Role of Metals and Metal Compounds in Flame and Smoke Retardation in PVC", L. D. Wescott, Jr., P. A. Linxwiler, and W. H. Starnes, Jr., presented by LDW in the 6th International Symposium on Analytical and Applied Pyrolysis, Wiesbaden, West Germany, September 25, 1984.

***** "Microstructural Studies of Halogenated Synthetic Polymers Using Carbon-13 NMR", W. H. Starnes, Jr., presented in the Symposium on Spectroscopic Characterization of Macromolecules, PAC CHEM '84 Congress, Honolulu, Hawaii, December 21, 1984.

***** "Carbon-13 NMR Studies of the Structures and Polymerization Mechanisms of Poly(vinyl chloride) and Related Copolymers", Plenary Lecture presented in the International Symposium on Characterization and Analysis of Polymers, Melbourne, Australia, February 12, 1985.

"Activation Parameters and Color Effects in the Thermal Dehydrochlorination of Chemically Pretreated Poly(vinyl chloride)", J. S. Shapiro, W. H. Starnes, Jr., I. M. Plitz, and D. C. Hische, presented by JSS in the International Symposium on Characterization and Analysis of Polymers, Melbourne, Australia, February 13, 1985.

***** "Unconventional Mechanistic Pathways during the Free-Radical Copolymerization of Vinyl Chloride", presented to:

1. School of Chemistry, Macquarie University, North Ryde, Australia, February 19, 1985.

2. Queensland Polymer Group, Brisbane, Australia, February 22, 1985.

3. Department of Chemistry, Polytechnic Institute of New York, Brooklyn, New York, March 29, 1985.

4. Department of Polymer Science, University of Akron, Akron, Ohio, May 15, 1985.

***** "Microstructures and Polymerization Mechanisms of Poly(vinyl chloride) and Related Copolymers", presented at the Research and Development Center, Armstrong World Industries, Inc., Lancaster, Pennsylvania, March 11, 1985.

"Thermolysis Rates and Products of the Putative Ketochloroallyl Groups in Poly(vinyl chloride), As Inferred from the Behavior of Analogous Model Compounds", M. G. Panek, G. M. Villacorta, W. H. Starnes, Jr., and I. M. Plitz, presented by WHS at the 189th National Meeting of the American Chemical Society, Miami Beach, Florida, April 29, 1985.

"Mechanistic Studies on the Role of Molybdenum and Copper Compounds in Flame and Smoke Suppression in PVC", L. D. Wescott, Jr., P. A. Linxwiler, J. L. Yancey, and W. H. Starnes, Jr., presented by LDW in the Symposium on Combustion Inhibition of Polymers, 17th Central Regional Meeting of the American Chemical Society, Akron, Ohio, June 7, 1985.

***** "Mechanism and Structure in the Free-Radical Polymerization and Copolymerization of Vinyl Chloride", presented at:

1. Symposium on Free-Radical Polymerization, 17th Central Regional Meeting of the American Chemical Society, Akron, Ohio, June 7, 1985.

2. Research Laboratories, Rohm and Haas Company, Bristol, Pennsylvania, November 1, 1985.

3. Department of Chemistry, University of Missouri - Rolla, Rolla, Missouri, April 23, 1987.

***** "Structure and Mechanism in the Free-Radical Copolymerization of Vinyl Chloride", presented at:

1. Graduate School and University Center, City University of New York, December 5, 1985.

2. Brooklyn Subsection Meeting of the American Chemical Society, Brooklyn, New York, February 20, 1986.

3. Westhollow Research Center, Shell Development Company, Houston, Texas, April 7, 1986.

4. Research and Development Center, B. F. Goodrich Company, Brecksville, Ohio, May 8, 1986.

5. Research Laboratories, Dow Chemical Company, Midland, Michigan, August 18, 1986.

6. Exxon Research Center, Linden, New Jersey, November 20, 1986.

7. Michigan Molecular Institute, Midland, Michigan, February 10, 1987.

8. Department of Chemistry, McGill University, Montreal, Canada, March 24, 1987.

9. Department of Chemistry, University of New Mexico, Albuquerque, New Mexico, May 7, 1987.

10. Sandia National Laboratories, Albuquerque, New Mexico, May 11, 1987.

11. Institute for Materials Research, McMaster University, Hamilton, Canada, November 13, 1987.

***** "The Minsker Theory of PVC Degradation: Current Status", presented in the Symposium on Polymer Degradation and Stabilization, Polytechnic University, Brooklyn, New York, December 12, 1986.

***** "Thermal Degradation of Poly(vinyl chloride): Current Status of the Minsker Theory", presented to the Department of Chemistry, Central Michigan University, Mt. Pleasant, Michigan, February 9, 1987.

***** "Stabilization of Poly(vinyl chloride) and Related Materials", presented at the Gordon Research Conference on Polymers, New London, New Hampshire, July 3, 1987.

* "Poly(vinyl chloride) Smoke Suppression by Metal Salts: Current Status", presented at the Gordon Research Conference on Analytical Pyrolysis, Plymouth, New Hampshire, July 8, 1987.

***** "Why Poly(vinyl chloride) Has Low Thermal Stability", presented at:

1. Lexington Laboratory, Kendall Company, Lexington, Massachusetts, July 10, 1987.

2. Research Laboratories, Morton Thiokol, Inc. (Carstab Division), Cincinnati, Ohio, August 7, 1987.

***** "Mechanisms of Poly(vinyl chloride) Smoke Suppression by Metal Salts", presented at the Research Laboratories of Morton Thiokol, Inc. (Carstab Division), Cincinnati, Ohio, August 7, 1987.

***** "Carbon-13 NMR Studies of Vinyl Chloride Copolymers with Unusual Microstructures", presented at:

1. Department of Chemistry, University of Texas at Dallas, Dallas, Texas, December 14, 1987.

2. Department of Chemistry, University of Alabama, Tuscaloosa, Alabama, January 28, 1988.

3. Department of Chemistry, College of Staten Island, City University of New York, March 11, 1988.

4. Department of Polymer Science and Engineering, University of Massachusetts, Amherst, Massachusetts, April 1, 1988.

5. Department of Chemistry, Baylor University, Waco, Texas, April 4, 1988.

***** "Polymer Degradation and Stabilization", W. H. Starnes, Jr., presented at the 22nd Middle Atlantic Regional Meeting of the American Chemical Society, Millersville, Pennsylvania, May 25, 1988.

***** "Poly(vinyl chloride) Degradation: Recent Progress and Unsolved Problems", W. H. Starnes, Jr., presented in the Symposium on Environmental Degradation and Stabilization of Polymers, 3rd Chemical Congress of North America, Toronto, Canada, June 6, 1988.

***** "Mechanisms of PVC Smoke Suppression by Metal Salts: Current Status", W. H. Starnes, Jr., presented at the 11th Discussion Conference, Prague Meetings on Macromolecules, Prague, Czechoslovakia, July 13, 1988.

***** "Structure and Mechanism in the Free-Radical Copolymerization of Vinyl Chloride", Opening Plenary Lecture for the 31st Microsymposium, Prague Meetings on Macromolecules, Prague, Czechoslovakia, July 18, 1988.

***** "Fundamental Aspects of PVC Degradation and Stabilization: Current Status and Recent Advances", Plenary Lecture for the International Symposium on PVC and Initiators, Scheveningen, The Netherlands, September 8, 1988.

***** "The Microstructure of PVC and Vinyl Chloride Copolymers", Keynote Address for the Society of Plastics Engineers RETEC Conference on Vinyl - A Material for the Future, Montreal, Canada, September 16, 1988.

***** "Polymer Degradation", presented at the Chemical Research Division Laboratories of the American Cyanamid Company, Stamford, Connecticut, October 18, 1988.

***** "Effects of Carbonyl Structures on PVC Stability: The Minsker Theory and Others", presented to the Department of Chemistry, University of Alabama, Tuscaloosa, Alabama, January 12, 1989.

***** "Theories of Poly(vinyl chloride) Thermal Instability: The Minsker Proposal and Others", presented to the Department of Chemistry, College of William and Mary, Williamsburg, Virginia, February 6, 1989.

***** "Current Theories of the Thermal Instability of Poly(vinyl chloride)", presented to the joint colloquium of the Department of Polymers and Coatings and the Department of Chemistry, North Dakota State University, Fargo, North Dakota, February 13, 1989.

***** "Theories of the Thermal Instability of Poly(vinyl chloride)", presented to the Department of Chemistry, Virginia Commonwealth University, Richmond, Virginia, February 20, 1989.

***** "Thermal Stability and Degradation of Poly(vinyl chloride)", presented to the technical staff of E. I. du Pont de Nemours & Co., Buffalo, New York, March 22, 1989.

***** "Theories of Poly(vinyl chloride) Thermal Instability: The Minsker Proposal and Others", presented to the Department of Chemistry, Queen's University, Kingston, Canada, April 5, 1989.

***** "Mechanistic Studies of Copper Additives as Poly(vinyl chloride) Smoke Suppressants", W. H. Starnes, Jr., and C.-H. O. Huang, presented by WHS in the Symposium on Fire and Polymers, 197th National Meeting of the American Chemical Society, Dallas, Texas, April 11, 1989.

***** "The Minsker Theory of PVC Instability", AIC Honor Scroll Award Address, presented to the New Jersey Institute of Chemists, Cedar Grove, New Jersey, April 26, 1989.

***** "PVC Stability", presented at the combined research laboratories of European Vinyls Corporation and Imperial Chemical Industries, Runcorn, England, August 29, 1989.

***** Lectures presented in the International PVC Stability Symposium, Chester, England, August 31, 1989:

1. "Thermal Stability of PVC".

2. "Anomalous Structure Characterization in PVC".

3. "Roles of Anomalous Structures in PVC".

"Microstructures of Vinylidene Chloride – Methyl Acrylate (VDC–MA) Copolymers", S. Gopalkrishnan and W. H. Starnes, Jr., presented by SG at the 198th National Meeting of the American Chemical Society, Miami Beach, Florida, September 12, 1989.

***** "PVC Flame and Smoke Suppression", presented at the research laboratories of GenCorp, Inc., Akron, Ohio, December 1, 1989.

***** "Microstructure of PVC", Opening Plenary Lecture for the PVC Molecular Modeling Conference, Copley, Ohio, January 24, 1990.

***** "Mechanistic Aspects of Poly(vinyl chloride) Flame and Smoke Suppression", presented at the Ethyl Corporation Technical Center, Baton Rouge, Louisiana, March 23, 1990.

***** "Molecular Structure and Stability of Poly(vinyl chloride) and Related Copolymers", presented to the following research organizations in the Soviet Union, May 21 - June 1, 1990:

1. Institute of Chemical Physics, Moscow.

2. Institute of Element-Organic Compounds, Moscow.

3. Institute of Synthetic Polymeric Materials, Moscow.

4. Institute for the Chemistry of High-Molecular Compounds, Kiev.

5. Institute of High-Molecular Compounds, Leningrad.

6. Physical Technical Institute, Leningrad.

***** Lectures presented at the University of Toronto, Canada, in the Continuing Studies course on Poly(vinyl chloride): Recent Developments and Future Trends, June 14-15, 1990:

1. "PVC Degradation: Part I".

2. "PVC Degradation: Part II".

3. "PVC Stabilization".

***** "Recent Advances in the Degradation and Flammability of PVC", Plenary Lecture presented at the Polymer Degradation Discussion Group Conference on Thermal Stabilization and Flammability of Polymers and Composites, Glasgow, Scotland, U.K., September 6, 1990.

***** "Mechanistic Features of the Thermal Degradation and Stabilization of PVC", Plenary Lecture presented in the Second International Akzo Symposium on PVC and Initiators, Singapore, October 25, 1990.

***** "Microstructure and Thermal Stability of Poly(vinyl chloride): The Current Status", W. H. Starnes, Jr., and B. J. Wojciechowski, presented by WHS in the Symposium on Polymer Lifetimes, Annual Spring Meeting of the Materials Research Society, Anaheim, California, April 29, 1991.

"Chemical Stabilization of Poly(vinyl chloride) by Pretreatment with *N*-Substituted Maleimides", A. Velazquez and W. H. Starnes, Jr., poster presentation *in absentia* arranged by WHS for the 203rd National Meeting of the American Chemical Society, New York, New York, August 25, 1991.

***** "Molecular Microstructure and Polymerization Mechanism of Poly(vinyl chloride): Recent Developments", presented at the Avon Lake Technical Center of the B. F. Goodrich Company, Avon Lake, Ohio, September 16, 1991.

"Structure and Mechanism in the Chemical Stabilization of Poly(vinyl chloride) by Pretreatment with Maleimide Derivatives", A. Velazquez and W. H. Starnes, Jr., presented by WHS at the 43rd Southeastern Regional Meeting of the American Chemical Society, Richmond, Virginia, November 13, 1991.

"Poly(vinyl chloride) Fact and Fantasy: Death of a Structural Defect?", B. J. Wojciechowski, W. H. Starnes, Jr., and G. M. Benedikt, presented by BJW at the 43rd Southeastern Regional Meeting of the American Chemical Society, Richmond, Virginia, November 13, 1991.

"Mechanism of Chain Transfer to the Monomer during the Free-Radical Polymerization of Vinyl Acetate", H. S. Chung, W. H. Starnes, Jr., and G. M. Benedikt, presented by HSC at the 43rd Southeastern Regional Meeting of the American Chemical Society, Richmond, Virginia, November 13, 1991.

***** "Degradation of Vinyl Chloride Polymers", presented to the Technical Staff of the Viskase Corporation, Chicago, Illinois, January 27, 1992.

***** "Stabilization of Vinyl Chloride Polymers", presented to the Technical Staff of the Viskase Corporation, Chicago, Illinois, January 27, 1992.

"1,2-Dichloroethyl Branches in Poly(vinyl chloride)", W. H. Starnes, Jr., B. J. Wojciechowski, A. Velazquez, and G. M. Benedikt, presented by WHS at the 203rd National Meeting of the American Chemical Society, San Francisco, California, April 5, 1992.

***** "Mechanistic and Structural Aspects of the Free-Radical Polymerization of Vinyl Chloride", Main Lecture presented in the 34th IUPAC International Symposium on Macromolecules, Prague, Czechoslovakia, July 13, 1992.

***** "1,2-Dichloroethyl Branches in Poly(vinyl chloride): Their Implications for Thermal Stability and the Mechanism of Polymerization", Plenary Lecture presented at the International Conference on Regulation of Polymeric Materials Stability, Moscow, Russia, October 13, 1992.

"Carbon-13 NMR Study of the Mechanism of Transfer to Monomer during the Polymerization of Vinyl Acetate", W. H. Starnes, Jr., H. Chung, and G. M. Benedikt, presented by WHS at the 205th National Meeting of the American Chemical Society, Denver, Colorado, March 28, 1993.

***** "Transfer to Monomer and Structural Defect Formation during the Polymerization of Vinyl Chloride", presented to the Department of Chemistry, Virginia Polytechnic Institute & State University, Blacksburg, Virginia, April 14, 1993.

***** "Recent Mechanistic Studies of Polymers", presented to the Department of Chemistry, Marquette University, Milwaukee, Wisconsin, April 23, 1993.

***** "Vinyl Chloride Polymerization: Extraordinary Chemical Complexity in a Superficially Simple System", presented to the Akron Section of the American Chemical Society, May 13, 1993.

Lectures presented in the William and Mary Continuing Education course on Poly(vinyl chloride): Recent Research Advances, Williamsburg, Virginia, June 10, 1993:

1. "Microstructure of PVC and Mechanism of Vinyl Chloride Polymerization".
2. "PVC Thermal Degradation and Stabilization".
3. "PVC Photodegradation".
4. "PVC Flammability and Smoke Suppression".

***** "Poly(vinyl chloride) Microstructure Determination", presented at the research laboratories of GenCorp, Inc., Akron, Ohio, August 19, 1993.

***** "Exclusive Formation of the Thermally Labile Structures in Poly(vinyl chloride) via Hydrogen Abstraction by Macroradicals", W. H. Starnes, Jr., H. Chung, B. J. Wojciechowski, D. E. Skillicorn, and G. M. Benedikt, Opening Lecture presented by WHS in the International Symposium on Lifetime, Degradation, and Stability of Macromolecular Materials, 206th National Meeting of the American Chemical Society, Chicago, Illinois, August 22, 1993.

***** "Mechanistic Studies of Copper Additives as Smoke Suppressants for Poly(vinyl chloride)", C.-H. O. Huang and W. H. Starnes, Jr., presented by CHOH in the 2nd Beijing International Symposium on Flame Retardants, Beijing, People's Republic of China, October, 1993.

"The Frye-Horst Mechanism for the Stabilization of Poly(vinyl chloride) by Organic Metal Salts: A Critical Reassessment", W. H. Starnes, Jr., presented at the 207th National Meeting of the American Chemical Society, San Diego, California, March 13, 1994.

***** "A New Approach to Smoke Suppression in Vinyl Chloride Polymers", W. H. Starnes, Jr., J. P. Jeng, S. A. Terranova, E. Bonaplata, K. Goldsmith, D. M. Williams, and B. J. Wojciechowski, presented by WHS at the 5th Annual BCC Conference on Flame Retardancy, Stamford, Connecticut, May 24, 1994.

"Unprecedented End Groups in Poly(vinyl chloride): Polymerization of Vinyl Chloride Using Di-*t*-alkylmagnesium Initiators", G. M. Benedikt, R. J. Cozens, B. L. Goodall, L. F. Rhodes, M. N. Bell, A. C. Kemball, and W. H. Starnes, Jr.

1. Presented by LFR at the 35th IUPAC International Symposium on Macromolecules, Akron, Ohio, July 12, 1994.

2. Presented by BLG at the Gordon Research Conference on Organometallics, July 25, 1994.

* "Copper-Promoted Reductive Coupling as a Potential Means of Smoke Suppression in Poly(vinyl chloride)", J. P. Jeng, S. A. Terranova, E. Bonaplata, K. Goldsmith, D. M. Williams, and W. H. Starnes, Jr., presented by WHS in the Symposium on Fire and Polymers, 208th National Meeting of the American Chemical Society, Washington, D. C., August 23, 1994.

***** "Methods for Making CPVC with Improved Properties", presented at the B. F. Goodrich Co. Research and Development Center, Brecksville, Ohio, August 29, 1994.

***** "Metal-Promoted Reductive Coupling: A New Smoke-Suppression Strategy for Chlorine-Containing Polymers", W. H. Starnes, Jr., R. D. Pike, W. S. Bryant, J. P. Jeng, and P. Kourtesis, presented by RDP at the Additives '95 Conference, Clearwater Beach, Florida, February 23, 1995.

***** "Mechanisms for Transfer to Monomer in Vinyl Chloride Polymerization and Their Relevance to the Stability of PVC", presented at the 2nd North American Research Conference on the Stabilization and Degradation of Polymers, Hilton Head, South Carolina, March 13, 1995.

"The Reaction of Macroradicals with Alkene Chain Ends during the Polymerization of Vinyl Chloride", W. H. Starnes, Jr., H. Chung, R. D. Pike, B. J. Wojciechowski, V. G. Zaikov, G. M. Benedikt, B. L. Goodall, and L. F. Rhodes, presented by WHS at the 209th National Meeting of the American Chemical Society, Anaheim, California, April 2, 1995.

"Diffusion-Controlled Propagation in Vinyl Chloride Polymerization? Evidence Against Its Occurrence from Dichlorobutyl Branch Concentrations", W. H. Starnes, Jr., B. J. Wojciechowski, H. Chung, G. M. Benedikt, G. S. Park, and A. H. Saremi, presented by WHS at the 209th National Meeting of the American Chemical Society, Anaheim, California, April 2, 1995.

***** "Low-Valent Metal Complexes as Reductive Coupling Agents for Smoke Suppression in Vinyl Chloride Polymers", R. D. Pike, W. H. Starnes, Jr., W. S. Bryant, J. P. Jeng, and P. Kourtesis, presented by RDP at the 6th Annual BCC Conference on Flame Retardancy, Stamford, Connecticut, May 23, 1995.

Lectures presented in the William and Mary Continuing Education course on Poly(vinyl chloride) and Other Chlorinated Polymers: Recent Research Advances, Williamsburg, Virginia, June 8-9, 1995:

1. "Microstructure of PVC and Mechanism of Vinyl Chloride Polymerization".

2. "PVC Thermal Degradation and Stabilization".

3. "PVC Photodegradation".

4. "PVC Flammability and Smoke Suppression".

"Polymerization of Vinyl Chloride Using Di-*t*-alkyl Group II Metal Initiators", G. M. Benedikt, R. J. Cozens, B. L. Goodall, L. F. Rhodes, M. N. Bell, A. C. Kemball, and W. H. Starnes, Jr., presented by LFR in the Symposium on Polymer Synthesis with Organometallic Complexes, 210th National Meeting of the American Chemical Society, Chicago, Illinois, August 24, 1995.

***** "Poly(vinyl chloride) Degradation: Perspective and Prognosis", Plenary Lecture presented at the 20th Polymer Degradation Discussion Group Conference on Thermal Degradation of Polymers (in honor of Professor Norman Grassie), Glasgow, Scotland, U. K., September 15, 1995.

***** "The PVC Program at William and Mary: Recent Research Advances in Polymer Microstructure, Stabilization, Smoke Suppression, and the Mechanism of Polymerization", W. H. Starnes, Jr., Opening Plenary Lecture for the Society of Plastics Engineers RETEC Conference on What's New in PVC?, New Brunswick, New Jersey, October 24, 1995.

***** Lectures presented at the Union Carbide Technical Center, Bound Brook, New Jersey, February 5, 1996:

1. "PVC Microstructure".
2. "Mechanism of Vinyl Chloride Polymerization".
3. "PVC Thermal Degradation".
4. "PVC Thermal Stabilization".
5. "PVC Photodegradation".

***** "Metal-Promoted Reductive Coupling for Smoke Suppression and Fire Retardance in Poly(vinyl chloride)", W. H. Starnes, Jr., R. D. Pike, W. S. Bryant, P. Kourtesis, J. A. Macko, and C. P. O'Brien, presented by WHS at the Additives '96 Conference, Houston, Texas, February 19, 1996.

"Kinetic and Thermodynamic Appraisal of a Remarkable Cyclic Mechanism for Poly(vinyl chloride) Degradation", W. H. Starnes, Jr., presented at the 211th National Meeting of the American Chemical Society, New Orleans, Louisiana, March 24, 1996.

"Low-Valent Metal Complexes: Reductive Coupling Agents for Smoke Suppression in Poly(vinyl chloride)", R. D. Pike, W. H. Starnes, Jr., P. Kourtesis, W. S. Bryant, C. P. O'Brien, and J. Macko, presented by RDP at the 30th Mid-Atlantic Regional Meeting of the American Chemical Society, Villanova, Pennsylvania, May 23, 1996.

***** Lectures presented at the Akzo Nobel Research Center, Dobbs Ferry, New York, July 22, 1996:

1. "Microstructure of Poly(vinyl chloride)".
2. "Mechanism of Vinyl Chloride Free-Radical Polymerization".
3. "Synthesis of Poly(vinyl chloride) by Non-Free-Radical Routes".
4. "Thermal Degradation of Poly(vinyl chloride)".
5. "Thermal Stabilization of Poly(vinyl chloride)".

***** Lectures presented at the Beijing Institute of Technology, Beijing, China, October 14-17, 1996:

1. "PVC and Chlorinated PVC: Production, Marketing, and Research in the USA".
2. "The William and Mary Doctoral Program in Applied Science".

3. "Molecular Microstructure of PVC".

4. "Thermal Degradation of PVC".

5. "PVC Smoke Suppression and Fire Retardance by Lewis-Acid Additives".

6. "Reductive Coupling as a Potential New Technique for PVC Smoke Suppression and Fire Retardance".

***** "Microstructure and Thermal Stability of Poly(vinyl chloride)", presented at the Technology Center of the Occidental Chemical Corporation, Grand Island, New York, December 17, 1996.

***** "Early Color, Non-Radical Synthesis, and Fire Retardance of PVC", presented at the Corporate Headquarters of Norsk Hydro a.s.a., Oslo, Norway, January 8, 1997.

***** "A New Look at Some Old Antioxidant Chemistry", W. H. Starnes, Jr., presented at the Additives '97 Conference, New Orleans, Louisiana, February 3, 1997.

***** "PVC Smoke Suppression by Reductive Coupling: New Additives and Their Functions", W. H. Starnes, Jr., R. D. Pike, S. Bunge, Y. Kang, A. Kim, J. A. Macko, and C. P. O'Brien, presented by WHS at the Additives '97 Conference, New Orleans, Louisiana, February 5, 1997.

"Homogeneous Synthesis of Polyaniline Using DDQ as the Oxidant", P. Y. Cooper, F. L. Klavetter, and W. H. Starnes, Jr., presented by PYC at the 213th National Meeting of the American Chemical Society, San Francisco, California, April 13, 1997.

* "Metal-Promoted Reductive Coupling for Smoke Suppression in Poly(vinyl chloride)", R. D. Pike, W. H. Starnes, Jr., C. W. Adams, S. D. Bunge, Y. M. Kang, A. S. Kim, J. H. Kim, J. A. Macko, and C. P. O'Brien, presented by RDP at the 8th Annual BCC Conference on Flame Retardancy, Stamford, Connecticut, June 2, 1997.

***** "Areas of Opportunity in Vinyl Research", Opening Plenary Lecture for the Vinyl Research Session of the World Vinyl Forum, Akron, Ohio, September 9, 1997.

"Cupric-Acetate-Promoted Depolymerization of Poly(methyl methacrylate)", R. D. Pike, W. H. Starnes, Jr., K. A. Smeds, J. A. Macko, C. W. Adams, and K. J. Franke, presented by RDP at the 49th Southeastern Regional Meeting of the American Chemical Society, Roanoke, Virginia, October 20, 1997.

"Mechanism of Transfer to Benzene in the Polymerization of Vinyl Acetate", H. Yao and W. H. Starnes, Jr., presented by HY at the 5th Annual Industry-Academia Minisymposium, Richmond, Virginia, November 21, 1997.

"Promotion of Poly(methyl methacrylate) Depolymerization by Copper Compounds", R. D. Pike, W. H. Starnes, Jr., K. A. Smeds, J. A. Macko, K. J. Franke, and C. W. Adams, presented by

RDP at the 5th Annual Industry-Academia Minisymposium, Richmond, Virginia, November 21, 1997.

"Smoke Supression of Poly(vinyl chloride) by Reductive Coupling Agents", Y. M. Kang, R. D. Pike, W. H. Starnes, Jr., J. P. Jeng, W. S. Bryant, P. Kourtesis, C. W. Adams, S. D. Bunge, A. S. Kim, J. H. Kim, J. A. Macko, and C. P. O'Brien, presented by YMK at the 5th Annual Industry-Academia Minisymposium, Richmond, Virginia, November 21, 1997.

***** Lectures presented at the PVC Technical Center of Norsk Hydro a.s.a., Porsgrunn, Norway, January 8, 1998:

1. "Molecular Microstructure of PVC".
2. "Mechanism of the Free-Radical Polymerization of Vinyl Chloride".
3. "Vinyl Chloride Polymerization by Non-Free-Radical Methods".
4. "Thermal Degradation of PVC".
5. "Thermal Stabilization of PVC".

* "Vinyl Heat Stabilizers Containing No Heavy Metals", W. H. Starnes, Jr., presented at the EPIC PVC Conference, Akron, Ohio, January 15, 1998.

* "Smoke Suppression of PVC by Reductive Crosslinking", W. H. Starnes, Jr., R. D. Pike, C. W. Adams, S. D. Bunge, Y. M. Kang, A. S. Kim, and J. H. Kim, presented by WHS at the Additives '98 Conference, Orlando, Florida, February 16, 1998.

* "Structure, Degradation, and Stabilization of Chlorine-Containing Polymers", W. H. Starnes, Jr., presented at the Intensive Short Course on Polymer Degradation and Stabilization, Hilton Head, South Carolina, March 1, 1998.

* "Poly(vinyl chloride) Smoke Suppression by Reductive Crosslinking: Recent Developments", W. H. Starnes, Jr., R. D. Pike, C. W. Adams, S. D. Bunge, Y. M. Kang, A. S. Kim, J. H. Kim, J. R. Parkinson, and L. F. Walker, presented by WHS at the 9th Annual BCC Conference on Flame Retardancy, Stamford, Connecticut, June 1, 1998.

"NMR Characterization of Poly(vinyl acetate) Microstructures Formed by Chain Transfer to Benzene", H. Yao and W. H. Starnes, Jr., presented by HY at the 3rd National Graduate Research Polymer Conference, Akron, Ohio, June 23, 1998.

"Doubly Branched Structures in Poly(vinyl chloride)", V. G. Zaikov and W. H. Starnes, Jr., presented by VGZ at the 3rd National Graduate Research Polymer Conference, Akron, Ohio, June 23, 1998.

* "Mechanism and Microstructure in the Heterogeneous Polymerization of Vinyl Chloride", W. H. Starnes, Jr., presented in the Symposium on Heterogeneous Polymer Systems, 54th Southwest Regional Meeting of the American Chemical Society, Baton Rouge, Louisiana, November 1, 1998.

* "The Polymerization Chemistry of Vinyl Chloride", presented in the Polymer Science Symposium Series, University of Southern Mississippi, Hattiesburg, Mississippi, December 9, 1998.

* "New Copper Complexes for Poly(vinyl chloride) Smoke Suppression via Reductive Crosslinking", W. H. Starnes, Jr., R. D. Pike, M. S. Baksa, and J. M. Maksymonko, presented by WHS at the Additives '99 Conference, San Francisco, California, March 24, 1999.

* "Vinyl Chloride Polymerization and the Molecular Structure of PVC", presented to the research staff of the Congoleum Corporation, Mercerville, New Jersey, June 8, 1999.

* "Vinyl Heat Stabilizers Containing No Heavy Metals", W. H. Starnes, Jr., and V. G. Zaikov, presented by WHS at the EPIC PVC Technology Consortium Review, Akron, Ohio, September 15, 1999.

* "Reductive Crosslinking by Zerovalent Metals Formed *in Situ*: A New Approach to the Smoke Suppression and Fire Retardance of Poly(vinyl chloride)", W. H. Starnes, Jr., and R. D. Pike, presented by WHS at the Fire Retardant Chemicals Association Fall Conference, Tucson, Arizona, October 25, 1999.

* "The Remarkable Complexities of Vinyl Chloride Polymerization", presented to the Milwaukee Section of the American Chemical Society, Milwaukee, Wisconsin, March 17, 2000.

* "New Network Complexes of Copper and Their Potential as Smoke Suppression Agents in Poly(vinyl chloride)", R. D. Pike, W. H. Starnes, Jr., and P. M. Graham, presented by RDP at the Additives 2000 Conference, Clearwater Beach, Florida, April 10, 2000.

"Synthesis and Microstructure of Chlorinated Polyacetylenes", X. Ge and W. H. Starnes, Jr., presented by XG at the 4th National Graduate Research Polymer Conference, Hattiesburg, Mississippi, June 20, 2000.

"Further Evidence Against Six-Center Concerted Mechanisms for the Thermal Dehydrochlorination of Poly(vinyl chloride)", Y. Li and W. H. Starnes, Jr., presented by YL at the 4th National Graduate Research Polymer Conference, Hattiesburg, Mississippi, June 20, 2000.

* "Interaction of Antimony Oxide with a Chlorinated Organic Fire Retardant in Nylon 6,6", W. H. Starnes, Jr., Y. M. Kang, and L. B. Payne, presented by WHS in the Symposium on Fire and Polymers, 220th National Meeting of the American Chemical Society, Washington, D. C., August 22, 2000.

* "New Copper(I) Complexes as Potential Smoke Suppressants for Poly(vinyl chloride)", R. D. Pike, W. H. Starnes, Jr., P. M. Graham, J. T. Maeyer, W. A. Gomaa, A. S. Doyal, and E. R. Levy, presented by RDP in the Symposium on Fire and Polymers, 220th National Meeting of the American Chemical Society, Washington, D. C., August 22, 2000.

* "Reductive Dehalogenation in the Fire Retardance of Nylon 6,6 by an Antimony/Chlorine System", W. H. Starnes, Jr., Y. M. Kang, and L. B. Payne, presented by WHS at the Additives 2001 Conference, Hilton Head, South Carolina, March 21, 2001.

* "Poly(vinyl chloride) Degradation: Recent Mechanistic Investigations", W. H. Starnes, Jr., V. G. Zaikov, L. B. Payne, Y. Li, and X. Ge, presented by WHS in the Symposium on Durability of Plastics and Rubbers, 221st National Meeting of the American Chemical Society, San Diego, California, April 5, 2001.

* "PVC Microstructure and the Mechanism of Vinyl Chloride Polymerization", presented at the Ferro Corporation Technical Center, Independence, Ohio, April 12, 2001.

* "Mechanism of the Thermal Degradation of PVC: Recent Developments and Current Status", presented at the Ferro Corporation Technical Center, Independence, Ohio, April 12, 2001.

* "PVC Fire Retardance and Smoke Suppression: Mechanisms and New Approaches", W. H. Starnes, Jr., and R. D. Pike, presented by WHS at the 8th European Conference on Fire Retardant Polymers, Alessandria, Italy, June 25, 2001.

"Effects of Rate Constant Variations on the Simulation of Poly(vinyl chloride) Reduction with Tri-*n*-butyltin Hydride", S. K. Knudson and W. H. Starnes, Jr., presented by SKK in the International Symposium on PVC and Related Polymers: Chemistry and Applications, 222nd National Meeting of the American Chemical Society, Chicago, Illinois, August 28, 2001.

"Local Structure of PVC: An X-Ray and Neutron Scattering Study", G. R. Mitchell, T. Gkourmpis, Y. Chiou, W. H. Starnes, Jr., and V. G. Zaikov, presented by GRM in the International Symposium on PVC and Related Polymers: Chemistry and Applications, 222nd National Meeting of the American Chemical Society, Chicago, Illinois, August 29, 2001.

"Heat Stabilization and Plasticization by "Plasticizer Thiols", a Remarkable New Class of Nonmetallic Additives for PVC", W. H. Starnes, Jr., B. Du, and V. G. Zaikov, presented by WHS in the International Symposium on PVC and Related Polymers: Chemistry and Applications, 222nd National Meeting of the American Chemical Society, Chicago, Illinois, August 30, 2001.

* "Cone Calorimeter Studies of Reductive Crosslinking Agents for the Smoke Suppression and Fire Retardance of PVC", A. S. Doyal, P. J. Murray, R. D. Pike, and W. H. Starnes, Jr., presented by WHS at the Additives 2002 Conference, Clearwater Beach, Florida, March 25, 2002.

* "Nonmetallic Primary Heat Stabilizers for Poly(vinyl chloride)", W. H. Starnes, Jr., B. Du, S. Kim, and V. G. Zaikov, presented by WHS at the Additives 2002 Conference, Clearwater Beach, Florida, March 27, 2002.

* "Mechanism of PVC Thermolysis", presented at the Center for Research in Applied Chemistry (CIQA), Saltillo, Mexico, April 9, 2002.

* "Nonmetallic Heat Stabilizers for PVC", presented at the Center for Research in Applied Chemistry (CIQA), Saltillo, Mexico, April 9, 2002.

* "Cone Calorimetric Study of Copper Additive Smoke Suppression in Poly(vinyl chloride)", R. D. Pike, W. H. Starnes, Jr., A. S. Doyal, P. J. Murray, and J. Zhang, presented by RDP at the 13th Annual BCC Conference on Flame Retardancy, Stamford, Connecticut, June 5, 2002.

* "New Nonmetallic Additives for the Thermal Stabilization of PVC", W. H. Starnes, Jr., Opening Plenary Lecture for 1st General Session, 2nd International Conference on Polymer Modification, Degradation, and Stabilization, Budapest, Hungary, July 1, 2002.

* "New Nonmetallic Thermal Stabilizers for PVC", presented at the Corporate Laboratories of the Albemarle Corporation, Baton Rouge, Louisiana, July 25, 2002.

* "Smoke Suppression and Fire Retardance of PVC with Copper Complexes. A Novel Synergistic Effect", W. H. Starnes, Jr., R. D. Pike, A. S. Doyal, J. T. Lee, P. J. Murray, R. A. Quinlan, and J. Zhang, presented by WHS at the Additives 2003 Conference, San Francisco, California, April 9, 2003.

* "Research on Poly(vinyl chloride) at the College of William and Mary", presented at the Center for Research in Applied Chemistry (CIQA), Saltillo, Mexico, March 1, 2003.

* "New Metal-Based Smoke Suppressants for Poly(vinyl chloride): Recent Progress", W. H. Starnes, Jr., R. D. Pike, A. H. Brown, J. T. Lee, T. B. Showalter, K. M. Taylor, and J. Zhang, presented by WHS at the Additives 2004 Conference, Clearwater Beach, Florida, March 22, 2004.

* "My Career in Chemistry", presented to the Virginia Tech Chemistry Advisory Council and guests, Blacksburg, Virginia, April 17, 2004.

"Metalla-Organohydroborates as Potential Precursors for the Catalysis of Olefin Polymerization", J. Park, E. Ding, X. Chen, F. Lacroix, F.-C. Liu, S. Liu, X. Ge, W. Starnes, Jr., and S. Shore, presented by SS at the Boron Americas IX Conference, San Marcos, Texas, May 20, 2004.

* "Copper-Containing Additives for the Fire Retardance and Smoke Suppression of Poly(vinyl chloride)", W. H. Starnes, Jr., R. D. Pike, A. H. Brown, T. W. Fuller, R. A. Quinlan, T. B. Showalter, K. M. Taylor, and J. Zhang, presented by WHS in the Symposium on Fire and

Polymers, 228th National Meeting of the American Chemical Society, Philadelphia, Pennsylvania, August 23, 2004.

"Free-Radical Dechlorination of 'Dechlorane Plus' by Mixtures of Antimony(III) Oxide and Polymers", J. Zhang and W. H. Starnes, Jr., poster presentation by JZ in the Symposium on Fire and Polymers, 228th National Meeting of the American Chemical Society, Philadelphia, Pennsylvania, August 24, 2004.

* "Smoke Suppression and Fire Retardance of Poly(vinyl chloride) by Metal-Based Additives: Progress and Prognosis", W. H. Starnes, Jr., R. D. Pike, A. H. Brown, T. W. Fuller, J. T. Lee, R. A. Quinlan, T. B. Showalter, K. M. Taylor, and J. Zhang, presented by WHS as the Opening Keynote Lecture for the Symposium on Flame Retardancy, 32nd Annual Conference of the North American Thermal Analysis Society, Williamsburg, Virginia, October 6, 2004.

"Mechanism for the Reductive Dechlorination of 'Dechlorane Plus' by Mixtures of Antimony(III) Oxide and Polymers", J. Zhang and W. H. Starnes, Jr., presented by JZ in the Symposium on Flame Retardancy, 32nd Annual Conference of the North American Thermal Analysis Society, Williamsburg, Virginia, October 6, 2004.

"The Synthesis and Thermal Properties of Copper Melamine and Thiourea Complexes and Their Potential as Smoke Suppressants in Poly(vinyl chloride)", R. D. Pike, W. H. Starnes, Jr., H. N. Gaburo, M. E. Hilton, J. T. Lee, S. V. Orski, K. M. Taylor, A. B. Wiles, T. B. Showalter, and J. Zhang, presented by RDP in the Symposium on Flame Retardancy, 32nd Annual Conference of the North American Thermal Analysis Society, Williamsburg, Virginia, October 6, 2004.

* "Ester Thiols: Highly Effective Nonmetallic Additives for the Thermal Stabilization and Plasticization of Poly(vinyl chloride)", W. H. Starnes, Jr., B. Du, S. Kim, V. G. Zaikov, X. Ge, and E. K. Culyba, presented by WHS as the Opening Keynote Lecture for the Symposium on Medical Polymers, 32nd Annual Conference of the North American Thermal Analysis Society, Williamsburg, Virginia, October 6, 2004.

* "Ester Thiol Heat Stabilizers for PVC: Mechanism of Action and Recent Developments", W. H. Starnes, Jr., X. Ge, and E. K. Culyba, presented by WHS at the Additives 2005 Conference, New Orleans, Louisiana, April 4, 2005.

* "Ester Thiol Heat Stabilizers for PVC", presented to the research staff of Ciba Specialty Chemicals, Tarrytown, New York, February 28, 2005.

* "Cation Radicals and Ester Thiols in Poly(vinyl chloride) Thermolysis", presented to the Department of Chemistry and the Institute of Materials Science, University of Connecticut, Storrs, Connecticut, October 10, 2005.

* "Thermal Degradation and Stabilization of PVC: The Ester Thiol Technology", presented at the CertainTeed Polymer Technology Center, Blue Bell, Pennsylvania, January 20, 2006.

* "The Ester Thiol Technology for the Stabilization of PVC: Current Status", W. H. Starnes, Jr., B. Du, S. Kim, X. Ge, V. G. Zaikov, and E. K. Culyba, presented by WHS at the Additives 2006 Conference, Las Vegas, Nevada, January 31, 2006.

* "The Ester Thiol Technology for the Stabilization and Plasticization of PVC", W. H. Starnes, Jr., B. Du, S. Kim, X. Ge, V. G. Zaikov, and E. K. Culyba, presented by WHS at the 2nd Andean PVC Forum, Cartagena, Colombia, March 31, 2006.

"The Ester Thiol Technology for the Stabilization of PVC", W. H. Starnes, Jr., B. Du, S. Kim, V. G. Zaikov, X. Ge, E. K. Culyba, and P. M. Krai, presented by WHS at the 12th International Conference on Plastics Additives and Modifiers, Cologne, Germany, October 17, 2006.

* "Ester Thiols and Bimetallic Copper Oxides: New Additives for Thermal Stabilization and Smoke Suppression of PVC", presented at the Palisades Section Meeting of the Society of Plastics Engineers, Scotch Plains, New Jersey, January 18, 2007.

* "Mechanism of Action of Ester Thiols as Stabilizers for PVC", X. Ge, E. K. Culyba, and W. H. Starnes, Jr., presented by XG:

1. At the 65th Annual Technical Conference of the Society of Plastics Engineers, Cincinnati, Ohio, May 7, 2007 (Best Student Paper Award presentation, Vinyl Plastics Division).

2. Online in the Society of Plastics Engineers e-Live™ Series, July 24, 2007.

* "Smoke Suppression by Mixed-Metal Cu(II) Oxides in Commercially Formulated Flexible PVC. A New Synergistic Effect", W.-K. Ho, J. K. Walker, S. V. Orski, T. W. Fuller, A. G. Zestos, C. L. Grinnell, R. D. Pike, and W. H. Starnes, Jr., presented by WKH at the 18th Annual BCC Conference on Flame Retardancy of Polymeric Materials, Stamford, Connecticut, May 21, 2007.

"Recent Progress in the Smoke Suppression of Poly(vinyl chloride) by Copper-Containing Additives", W. H. Starnes, Jr., J. K. Walker, W.-K. Ho, R. D. Pike, A. G. Zestos, C. L. Grinnell, S. V. Orski, T. W. Fuller, and L. J. Vinh, presented by WHS at the 14th International Conference on Plastics Additives and Compounding, Barcelona, Spain, October 16, 2008.

"Ring-Opening Metathesis Polymerization of *cis*-3,4-Dichlorocyclobutene and Its Chlorination", X. Ge and W. H. Starnes, Jr., presented by XG at the John T. and Paige S. Smith Undergraduate Science Research Symposium, York, Pennsylvania, November 1, 2008.

* "My Career and Current Research", presented to three student/faculty/administrative groups, Union College, Barbourville, Kentucky, March 27, 2009.

* "Smoke Suppression of PVC by Metal-Exchanged Clay and Zeolite Additives", A. G. Zestos, C. L. Grinnell, L. J. Vinh, R. D. Pike, and W. H. Starnes, Jr., presented by AGZ at the 67th

Annual Technical Conference of the Society of Plastics Engineers, Chicago, Illinois, June 22, 2009 (Best Paper Award presentation, Vinyl Plastics Division).

"An Approach to Poly(1,2-dichloroethylene) Synthesis via Ring-Opening Metathesis Polymerization (ROMP)", X. Ge and W. H. Starnes, Jr., presented by XG at the 67th Annual Technical Conference of the Society of Plastics Engineers, Chicago, Illinois, June 22, 2009.

* "Mechanism for the Thermal Dehydrochlorination of Poly(vinyl chloride) and Recent Progress in the Smoke Suppression of Poly(vinyl chloride) by Copper-Containing Additives", presented to the technical staff of Lubrizol Advanced Materials, Inc., Cleveland, Ohio, July 10, 2009.

* "New Metal-Based Smoke Suppressants and Fire Retardants for PVC: Background and Recent Studies", presented to the technical staff of the Process Development Center, Albemarle Corp., Baton Rouge, Louisiana, May 7, 2010.

* "New Metal-Based Smoke Suppressants and Fire Retardants for Flexible PVC", R. A. Obniski, A. G. Zestos, C. L. Grinnell, L. J. Vinh, R. D. Pike, and W. H. Starnes, Jr., presented by RAO at the 21st Annual Flexible Vinyl Products Compounders National Conference of the Society of the Plastics Industry, Leesburg, Virginia, July 12, 2010.

* "Why a Politically Incorrect Polymer is Degrading: The Thermolysis Mechanism of PVC", presented to the School of Chemistry and Biochemistry, Georgia Institute of Technology, Atlanta, Georgia, March 10, 2011.

* "Fifty Years (or So) of Chemistry: A Career Perspective", presented to the Department of Natural Sciences, University of Virginia's College at Wise, Wise, Virginia, April 13, 2011.

"Free-Radical Intermediates in the Nonoxidative Thermal Dehydrochlorination of Poly(vinyl chloride)", W. H. Starnes, Jr., presented at the 69th Annual Technical Conference of the Society of Plastics Engineers, Boston, Massachusetts, May 3, 2011 (Elliott Weinberg Vinyl Communications Award and ANTEC Best Technical Paper Award lecture, Vinyl Plastics Division).

* "Poly(vinyl chloride) Degradation and Stabilization: Recent Technical Progress", W. H. Starnes, Jr., Plenary Lecture presented at the International Conference on Innovation in Polymer Science and Technology, Bali, Indonesia, December 1, 2011.

* "*Quo Vadis*, Union Graduate?", Commencement Address, Union College, Barbourville, Kentucky, May 4, 2013.

* "Selectivity and Reactivity in the Chlorination of PVC Model Compounds in Radical-Complexing Solvents", X. Ge and W. H. Starnes, Jr., presented by XG at the 72nd Annual Technical Conference of the Society of Plastics Engineers, Las Vegas, Nevada, April 29, 2014 (Elliott Weinberg Vinyl Communications Award lecture, Vinyl Plastics Division).

"William H. Starnes, Sr.: Scientific Agricultural Education Pioneer", presented at the Dedication Ceremony for Virginia Historical Highway Marker Z-292 titled *William H. Starnes: Agricultural Educator*, Ewing, Virginia, May 27, 2014.

* Keynote Address, Chemistry Commencement Exercises, Virginia Tech College of Science, Lyric Theater, Blacksburg, Virginia, May 16, 2015.

* "Ester Thiols for the Stabilization of PVC: Progress and Current Status", presented at the 27th Annual Flexible Vinyl Products Compounders National Conference of the Society of the Plastics Industry, The Breakers, Palm Beach, Florida, July 12, 2016.

* "Fifty Years with PVC", American Institute of Chemists Chemical Pioneer Award address, Philadelphia, Pennsylvania, May 9, 2019.