

## BIOGRAPHICAL SKETCH

<b>NAME:</b> <b>William Parker Lyon Carter</b>			
<b>TITLE:</b> Research Chemist Emeritus			
<b>PLACE OF BIRTH:</b> Eugene, Oregon, USA		<b>NATIONALITY:</b> United States	
<b>EDUCATION:</b>			
<b>INSTITUTION AND LOCATION</b>	<b>DEGREE</b>	<b>YEAR</b>	<b>SCIENTIFIC FIELD</b>
University of California, Riverside, CA	BA	1967	Chemistry
University of Iowa Iowa City, IA	Ph.D.	1973	Physical Chemistry
<b>HONORS:</b> University of California, Riverside Non-Senate Distinguished Researcher Award, 1992; Institute of Scientific Information "Highly Cited" researcher, 2003; California Air Resources Board Haagen-Smit Clean Air Award, 2005; Atmospheric Environment Haagen-Smit Prize, 2005			
<b>MEMBERSHIPS:</b> South Coast AQMD Scientific Advisory Council (1989 - 1997); California ARB Modeling Advisory Committee (1990 - 1993); Air Research Advisory Board of the Texas Air Research Center (1999-2010); the Scientific Advisory Committee for the Texas Environmental Research Consortium (2004-2010)			
<b>MAJOR RESEARCH INTEREST:</b> Atmospheric Chemistry of Organic Compounds			

### RESEARCH AND PROFESSIONAL EXPERIENCE:

- 1987 - Present    University of California, Riverside, CA. Statewide Air Pollution Research Center and College of Engineering Center for Environmental Research and Technology. Research Chemist (1987-2005), Research Chemist Emeritus (2005-present). Develops methods for evaluating relative ozone impacts of volatile organic compounds (VOCs) in photochemical air pollution. Develops chemical mechanisms for urban and regional airshed models used for research and regulatory applications. Develops procedures for using environmental chamber data for evaluating such mechanisms and VOC reactivity assessment. Directs environmental chamber research programs. Participates in or directs kinetic or mechanistic studies related to photochemical smog formation.
- 1973-1987    University of California, Riverside, CA. Statewide Air Pollution Research Center. Associate Research Chemist (1981-1987), Assistant Research Chemist (1976-1981) and Postgraduate Research Chemist (1973-1976). Developed chemical kinetic models for photochemical smog. Participated in planning and analysis of data for environmental chamber programs. Developed procedures and software for kinetic model calculations and analysis of chamber data. Participated in kinetic or mechanistic studies related to photochemical smog formation.
- 1970-1973    University of Iowa, Iowa City, IA. Graduate Research Assistant. Studied chemical activation systems involving photochemically produced free radicals employing vacuum and chromatographic techniques. Developed procedures and software for analysis of complex chemical activation systems.
- 1970-1972    University of Iowa, Iowa City, IA. Graduate Teaching Assistant. Assisted in physical chemistry and freshmen chemistry courses.
- 1967-1969    California Institute of Technology, Pasadena, CA. Graduate Research Assistant. Studied the mechanism of unimolecular pyrolysis reactions. Employed chromatographic and organic synthesis techniques.

## RESEARCH PUBLICATIONS

Optical Isomerizations During the Pyrolysis of Alkylcyclo-propanes: Evidence for Diradical Intermediates and an Estimate of Their Relative Rates of Bond Rotation and Ring Closure

J. Amer. Chem. Soc., **90**, 7344-7346 (1968)

Carter, W.P. and R.G. Bergman

Optically Active 1-Ethyl-2-Methylcyclopropanes in the Gas Phase. An Estimate of Relative Rates of Bond Rotation and Ring Closure in Diradical Intermediates

J. Amer. Chem. Soc., **91**, 7411-7425 (1969)

Bergman, R.G. and W.P. Carter

Behavior of Collisional Efficiencies in External Activation Systems.

J. Phys Chem., **78**, 612-617 (1974)

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Homoallylic Isomerization of 1-Penten-4-yl and the Critical Energy for Methyl + 1,3-Butadiene

J. Phys. Chem., **78**, 1245-1248 (1974)

Carter, W.P. and D.C. Tardy

Ring Opening of Chemically Activated Cyclopentyl and Methyl Cyclobutyl Radicals

J. Phys. Chem., **78**, 1573-1578 (1974)

Carter, W.P. and DC. Tardy

Analysis of External Activation Systems with Multiple Isomerizations and Decompositions

J. Phys. Chem., **78**, 1579-1582 (1974)

Carter, W.P. and D.C. Tardy

Reactions of Chemically Activated Pentenyl Radicals: Kinetic Parameters of 1,4 H Shifts and the Cis-Trans Isomerization of Homoallylic Radicals

J. Phys. Chem., **78**, 2201-2211 (1974)

Carter, W.P. and D. C. Tardy

The Effect of Latitude on the Potential for Formation of Photochemical Smog

Atmos. Environ., **10**, 731-734 (1976)

Nieboer, H., A.C. Lloyd, W.P. Carter and J.N. Pitts, Jr.

Evidence for Alkoxy Radical Isomerization in Photooxidations of C<sub>4</sub>-C<sub>6</sub> Alkanes Under Simulated Atmospheric Conditions

Chem. Phys. Lett., **42**, 22-27 (1976)

Carter, W.P., K.R. Darnall, A.C. Lloyd, A.M. Winer and J.N. Pitts, Jr.

Importance of RO<sub>2</sub> + NO in Alkyl Nitrate Formation from C<sub>4</sub>-C<sub>6</sub> Alkane Photooxidations Under Simulated Atmospheric Conditions

J. Phys. Chem., **80**, 1948-1950 (1976)

Darnal, K.R., W.P. Carter, A.M. Winer, A.C. Lloyd and J.N. Pitts, Jr.

Computer Modeling of Smog Chamber Data: Progress in Validating Detailed Mechanisms for the Photooxidation of Propene and n-Butane in Photochemical Smog

Int. J. Chem. Kinet., **11**, 45-101 (1979)

Carter, W.P., A.C. Lloyd, J.L. Sprung and J.N. Pitts, Jr.

Effects of Ultraviolet Spectral Distribution on the Photochemistry of Simulated Atmospheres

Atmos. Environ., **13**, 989-993 (1979)

Winer, A.M., G.M. Breuer, W.P. Carter, K.R. Darnall and J.N. Pitts, Jr.

Smog Chamber Studies of Temperature Effects on Photochemical Smog

Environ. Sci. Technol., **13**, 1094-1100 (1979)

Carter W.P.L., A.M. Winer, K.R. Darnall and J.N. Pitts, Jr.

Reactions of C<sub>2</sub> and C<sub>4</sub> α-hydroxy Radicals with O<sub>2</sub>

J. Phys. Chem., **83**, 2305-2311 (1979)

Carter, W.P.L., K.R. Darnall, R.A. Graham, A.M. Winer and J.N. Pitts, Jr.

A Smog Chamber and Modeling Study of the Gas Phase NO<sub>x</sub>-Air Photooxidations of Toluene and the Cresols

Int. J. Chem. Kinet., **12**, 779-836 (1980)

Atkinson, R., W.P.L. Carter, K.R. Darnall, A.M. Winer and J.N. Pitts, Jr.

The Effect of Peroxyacetyl Nitrate on the Initiation of Photochemical Smog

Environ. Sci. Technol., **15**, 831-834 (1981)

Carter, W.P.L., A.M. Winer and J.N. Pitts, Jr.

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Environ. Sci. Technol., **15**, 823-828 (1981)

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Evidence for Chamber Dependent Radical Sources: Impact on Kinetic Computer Models for Air Pollution

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Carter, W.P.L., R. Atkinson, A.M. Winer and J.N. Pitts, Jr.

Major Atmospheric Sink for Phenol and the Cresols: Reaction with the Nitrate Radical

Environ. Sci. Technol., **15**, 829-831 (1981)

Carter, W.P.L., A.M. Winer and J.N. Pitts, Jr.

An Experimental Protocol for the Determination of OH Radical Rate Constants with Organics Using Methyl Nitrite as an OH Radical Source

J. Air Pollut. Control Assoc., **31**, 1090-1092 (1981)

Atkinson, R., W.P.L. Carter, A.M. Winer and J.N. Pitts, Jr.

Gas Phase Reactions of NO<sub>x</sub>-Dimethylhydrazine with Ozone and NO<sub>x</sub> in Simulated Atmospheres. Facile Formation of N-Nitrosodimethylane

In N-nitroso Compounds, R.A. Scanlan and S.R. Tannenbaum, Es., ACS Symposium Series 174, 117 (1981)

Carter W.P.L., E.C. Tuazon, A.M. Winer and J.N. Pitts, Jr.

Effects of Kinetic Mechanisms and Hydrocarbon Composition on Oxidant-Precursor Relations Predicted by the EKMA Isopleth Technique

Atmos. Environ., **16**, 113-120 (1982)

Carter, W.P.L., A.M. Winer and J.N. Pitts, Jr.

Studies of Trace Non-ozone Species Produced in a Corona Discharge Ozonizer

J. Air Pollut. Control Assoc., **32**, 274-276 (1982)

Harris, G.W., W.P.L. Carter, A.M. Winer, R.A. Graham and J.N. Pitts, Jr.

Observations of Nitrous Acid in the Los Angeles Atmosphere and Implications for Predictions of Ozone-Precursor Relationships

Environ. Sci. Technol., **16**, 414-419 (1982)

Harris, G.W. W.P.L. Carter, A.M. Winer, J.N. Pitts, Jr., U. Platt and D. Perner

Kinetics of the Reactions of OH Radical with n-Alkanes at 299 ± 2 K

Int. J. Chem. Kinet., **14**, 781-788 (1982)

Atkinson, R., S.M. Aschmann, W.P.L. Carter, A.M. Winer and J.N. Pitts, Jr.

Rate Constants for the Gas Phase Reaction of OH Radicals with a Series of Ketones at 299 ± 2 K

Int. J. Chem. Kinet., **14**, 389-847 (1982)

Atkinson, R., S.M. Aschmann, W.P.L. Carter and J.N. Pitts, Jr.

Kinetics of the Gas Phase Reactions of OH Radicals with Alkyl Nitrates at 299 ∓ 2K

Int. J. Chem. Kinet., **14**, 919-926 (1982)

Atkinson, R., S.M. Aschmann, W.P.L. Carter, A.M. Winer

Experimental Investigation of Chamber-Dependent Radical Sources

Int. J. Chem. Kinet., **14**, 1071-1103 (1982)

Carter, W.P.L., R. Atkinson, A.M. Winer and J.N. Pitts, Jr.

Alkyl Nitrate Formation from the NO<sub>x</sub>-Air Photooxidations of C<sub>2</sub>-C<sub>8</sub> n-alkanes

J. Phys. Chem., **86**, 4563-4568 (1982)

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Reply to Comments on A Smog Chamber and Modeling Study of the Gas Phase NO<sub>x</sub>-Air Photooxidation of Toluene and the Cresols

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Kinetics of the Reactions of O<sub>3</sub> and OH Radicals with Furan and Thiphenes at 298 ∓ 2 K

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The Gas Phase Reaction of Hydrazine and Ozone: A Non-photolytic Source of OH Radicals for Measurement of Relative OH Radical Rate Constants

Int. J. Chem. Kinet., **15**, 619-629 (1983)

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Effects of Pressure on Product Yields in the NO<sub>x</sub>-Photooxidations of Selected Aromatic Hydrocarbons

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Gas Phase Reaction of 1,1-Dimethylhydrazine with Nitrogen Dioxide

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Atkinson, R., W.P.L. Carter and A.M. Winer

Effects of Ring Strain on Gas Phase Rate Constants: 1. Ozone Reactions with Cycloalkenes

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OH Radical Rate Constants and Photolysis Rates of α-Dicarbonyls

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Plum, C.N., E. Sanhueza, R. Atkinson, W.P.L. Carter and J.N. Pitts, Jr.

Effects of Ring Strain on Gas Phase Rate Constants. 2. OH Radical Reactions with Cycloalkanes

Int. J. Chem. Kinet., **15**, 1161-1177 (1983)

Atkinson, R., S.M. Aschmann and W.P.L. Carter

- Atmospheric Reactions of N-Nitrosodimethylamine and Dimethylnitramine  
Environ. Sci. Technol., **18**, 49-54 (1983)  
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Environ.. Health Perspect., **52**, 153-157 (1983)  
Pitts, J.N., Jr., A.M. Winer, G.W. Harris, W.P.L. Carter and E.C. Tuazon
- Kinetics of the Reactions of OH Radicals with a Series of Branched Alkanes at 297 ∓ 2 K  
Int. J. Chem. Kinet., **16**, 469-481 (1984)  
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- Rate Constants for the Gas Phase Reactions of NO<sub>3</sub> Radicals with a Series of Organic in Air at 298 ∓ 1 K  
J. Phys Chem., **88**, 1210-1215 (1984)  
Atkinson, R., C.N. Plum, W.P.L. Carter, A.M. Winer and J.N. Pitts, Jr.
- Rate Constants for the Gas Phase Reactions of NO<sub>3</sub> Radicals with a Series of Alkanes at 298 ∓ 1 K  
J. Phys. Chem., **88**, 2361-2364 (1984)  
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- Direct Determination of the Equilibrium Constant at 298 K for the NO<sub>2</sub> + NO<sub>3</sub> → N<sub>2</sub>O<sub>5</sub> Reactions  
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Tuazon, E.C., E. Sanhueza, R. Atkinson, W.P.L. Carter, A.M. Winer and J.N. Pitts, Jr.
- Kinetics of the Gas Phase Reactions of NO<sub>3</sub> Radicals with a Series of Aromatics at 296 ∓ 2 K  
Int. J. Chem. Kinet., **16**, 887-898 (1984)  
Atkinson, R., W.P.L. Carter, C.N. Plum, A.M. Winer and J.N. Pitts, Jr.
- Effects of Temperature and Pressure on the Photochemical Reactivity of a Representative Aviation Fuel  
Environ. Sci. Technol., **18**, 556-561 (1984)  
Carter, W.P.L., R. Atkinson and A.M. Winer
- An Investigation of the Dark Formation of Nitrous Acid in Environmental Chambers  
Int. J. Chem. Kinet., **16**, 919-939 (1984)  
Pitts, J.N., Jr., E. Sanhueza, R. Atkinson, W.P.L. Carter, A.M. Winer, G. W. Harris and C.N. Plum
- Kinetics of the Reactions of O<sub>3</sub> and OH Radicals with a Series of Dialkenes and Trialkenes at 294 ∓ 2 K  
Int. J. Chem.. Kinet., **16**, 967-976 (1984)  
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- Formation of Alkyl Nitrates from the Reaction of Branched and Cyclic Alkyl Peroxy Radicals with NO  
Int. J. Chem.. Kinet., **16**, 1085-1101 (1984)  
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- Kinetics and Mechanisms of the Gas Phase Reactions of Ozone with Organic Compounds Under Atmospheric Conditions  
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Atkinson, R. and W.P.L. Carter
- Rate Constants for the Gas Phase Reactions of OH Radicals and O<sub>3</sub> with Pyrrole at 295 ∓ 1 K and Atmospheric Pressure  
Atmos. Environ., **18**, 2105-2107 (1984)  
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- Yields of Glyoxal and Methylglyoxal from the NO<sub>x</sub>-Air Photooxidations of Toluene and m-and p-Xylene  
Environ. Sci. Technol., **18**, 981-984 (1984)  
Tuazon, E.C., R. Atkinson, H. MacLeod, H.W. Biermann, A.M. Winer, W.P.L. Carter and J.N. Pitts, Jr.

Rate Constants for the Gas Phase Reactions of NO<sub>3</sub> Radicals with Furan, Thiophene and Pyrrole at 295 ± 1 K and Atmospheric Pressure

Environ. Sci. Technol., **19**, 159-163 (1985)

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Atmospheric Chemistry of cis- and trans-3-Hexene-2,5-dione

Environ. Sci. Technol., **19**, 265-269 (1985)

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Extent of H-Atom Abstraction from the Reaction of the OH Radical with 1-Butene Under Atmospheric Conditions

Int. J. Chem. Kinet., **17**, 725-734 (1985)

Atkinson, R., E.C. Tuazon and W.P.L. Carter

Atmospheric Chemistry of Alkanes

J. Atmos. Chem., **3**, 377-405 (1985)

Carter, W.P.L., and R. Atkinson

α-Dicarbonyl Yields from the NO<sub>x</sub>-Air Photooxidations of a Series of Aromatic Hydrocarbons in Air

Environ. Sci. Technol., **20**, 383-387 (1986)

Tuazon, E.C., H. MacLeod, R. Atkinson and W.P.L. Carter

An Experimental Study of Incremental Hydrocarbon Reactivity

Environ. Sci. Technol., **21**, 670-679 (1987)

Carter, W.P.L. and R. Atkinson

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J. Atmos. Chem., **8**, 165-173 (1989)

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Computer Modeling Studies of Incremental Reactivities of Organics with Respect to Urban Ozone Formation

Transactions of the APCA International Specialty Conference on "The Scientific and Technical Issues Facing Post-1987 Ozone Control Strategies," November 16-19, 1988, Hartford, CT (1989)

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Int. J. Chem. Kinet., **21**, 801-827 (1989)

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J. Atmos Chem., **13**, 195-210 (1991)

Atkinson R. and W.P.L. Carter

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Atmos. Environ., **25A**, 2771-2806 (1991)

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Atmospheric Environment, 34, 4337-4348 (2000)

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Atmospheric Environment, 39 7768-7788 (2005)

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Atmospheric Environment, 44, 5324-5335, 2010

W, P. L. Carter

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Atmospheric Environment, 44, 5365-5374, 2010.

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W. P. L. Carter