

**JAAN LAANE** (b. 6-20-1942; Paide, Estonia; naturalized U. S. citizen 1956)

## **EDUCATION**

University of Illinois(Urbana), B. S. in Chemistry (June, 1964); Highest Distinction in Chemistry; Kendall Award (Outstanding Senior in Chemistry) and Highest University Honors (Bronze Tablet); Research Advisor: T. L. Brown  
Massachusetts Institute of Technology, Ph.D. in Chemistry (August, 1967); Kodak Award for Outstanding Chemistry Graduate Student (1967); Research Advisor: R.C. Lord  
University of Tartu, Estonia, Honorary D.Sc., (2000).

## **PROFESSIONAL EXPERIENCE**

Visiting Staff Member, Los Alamos Scientific Laboratory (summers)	1964-68
Assistant Professor, Tufts University	1967-68
Assistant, Associate (1972), and Full (1976) Professor, Texas A&M University	1968-
Visiting Professor, University of Bayreuth, Germany (Humboldt U. S. Senior Scientist Award)	1979-80, 1981, 1983
Visiting Professor, University of Ulm, Germany	1986
Visiting Professor, Stanford University	2002
Visiting Professor, University of Colorado (JILA)	2002
Professor of Physics, Texas A&M University	2007-
Visiting Professor, Technische Universität München, Germany (with A. Laubereau)	2009

## **ADMINISTRATION**

Chairman, Division of Physical and Nuclear Chemistry	1977-87, 1993-94
Speaker, Faculty Senate, Texas A&M University	1985-86
Associate Dean of Science (graduate studies)	1994-97
Director, Institute for Pacific Asia (Texas A&M)	1987-90
Exec. Deputy Director/Sr. Policy Advisor, Texas A&M, Japan	1990-94
Board of Directors, Alexander von Humboldt Association of America	2004-06
President-Elect, Alexander von Humboldt Association of America	2005-07
President, Alexander von Humboldt Association of America	2007-09

## **EDITORSHIP**

Editor, <i>Journal of Molecular Structure</i>	1994-
Editorial Board, <i>International Journal of Spectroscopy</i>	2008-
Editorial Board, <i>Laser Chemistry</i>	2009-
Editorial Board, <i>Journal of Spectroscopy &amp; Dynamics</i>	2010-

## **HONORS AND AWARDS**

E.J. James Scholar (1960-64); A.P. Sloan Scholar (1962-64); Illinois State Scholar (1960-1964); W. Morova Scholar (1960-62); Phi Eta Sigma (1961); Phi Kappa Phi (1962); Chemical Rubber Award (1961); A.S. Larsen Award (1961); Tomahawk (Activity Honorary, 1961); Kendall Award (The Outstanding Senior in Chemistry, 1964); University Honors (1961, 1962, 1963, 1964); Bronze Tablet (Highest University Honors, 1964); Phi Lambda Upsilon (1963); National Science Foundation Fellow (1964-67); Woodrow Wilson Fellow (1964-65); Kodak Award (The Outstanding Graduate Student in Chemistry, 1967); Alexander von Humboldt U.S. Senior Scientist Award (1979); Association of Former Students Teaching Award (1982); National Science Council Lectureship (Taiwan, 1984); Fellow, American Physical Society (1996); Fellow, American Institute of Chemists (1987); Phi Beta Delta, International Honor Society (1987), president (1990-91); Korean Chemical Society Lectureship (1989); Waseda University (Tokyo) Lectureship (1996); Elected to Estonian Academy of Science (1996); University of Valladolid (Spain) University Lectureship (1997); University of Ulm (Germany) Lectureship (1997); Robert A. Welch Foundation Lectureship (1998-1999); Honorary Doctorate, University of Tartu, Estonia (2000); Frontiers in Chemical Physics Lectures, The Ohio State University (2003); EUCMOS Lectureship (Krakow, 2004); Takahashi Lectureship (Tokyo, 2005); E.R. Lippincott Award in Molecular Spectroscopy (2005); Humboldt Research Award (2009).

## **TOTAL PUBLICATIONS**

294 including three books and 14 invited book chapters

## **TOTAL CONFERENCE PRESENTATIONS**

Approximately 400 including plenary and invited conference presentations/lectures

## **GRADUATE STUDENTS (Ph.D. and M.S.)**

Graduate student degrees: 35 Ph.D.; 5 M.S.; Undergraduate researchers: more than 50; Post-doctoral: approximately 20; Visiting faculty researchers: 14.

## **SELECTED PROFESSIONAL ACTIVITIES**

American Chemical Society, Texas A&M Section, Chair (1977), Alt. Councilor; Coblentz Society, Board of Managers (1983-87), Treasurer (1985-88); Chairman, Physical Chemistry, Southwest Regional American Chemical Society Meeting (1984); Program Advisory Committee and/or Session Chair for numerous spectroscopy meetings; President, Phi Beta Delta Honor Society, TAMU chapter (1990-91); Director, NATO Advanced Research Workshop, Ulm, Germany (September, 1992); Co-organizer, symposium on "Structure and Dynamics of Electronic Excited States" at Pacificchem '95; International Advisory Board, European Conference on Molecular Spectroscopy (EUCMOS) (1994-present); International Advisory Board, International Symposium on Molecular Spectroscopy, The Ohio State University (1997-2000); President, Texas Section (2001-

2002), National Board of Directors (2004-2006), President-Elect (2005-2007), President (2007-2009), Alexander von Humboldt Society of America; Editorial Board, International Journal of Spectroscopy (2008); Editorial Board, Laser Chemistry (2009); Editorial Board, Journal of Spectroscopy & Dynamics (2010).

## **PUBLICATIONS**

1. "Molecular Addition Compounds of Tin (IV) Chloride. III. Thermodynamic Data for 1:1 Addition Compound Formation." J. Laane and T. L. Brown, *Inorg. Chem.*, **3**, 148-149 (1964).
2. "Investigations in Methyltin Chemistry." J. Laane, B. S. Thesis, University of Illinois (1964).
3. "Silacyclobutane: Synthesis, Molecular Vibrations and the Ring-Puckering Potential; Far-Infrared Spectrum and Potential Function of Cyclopentene." J. Laane, Ph.D. Thesis, Massachusetts Institute of Technology (1967).
4. "Synthesis of Silacyclobutane and Some Related Compounds." J. Laane, *J. Amer. Chem. Soc.*, **89**, 1144-1147 (1967).
5. "Far-Infrared Spectra of Ring Compounds. II. The Spectrum and Ring-puckering Potential Function of Cyclopentene." J. Laane and R. C. Lord, *J. Chem. Phys.*, **47**, 4941-4945 (1967).
6. "Far-Infrared Spectra of Ring Compounds. III. Spectrum, Structure, and Ring-Puckering Potential of Silacyclobutane." J. Laane and R. C. Lord, *J. Chem. Phys.*, **48**, 1508-1513 (1968).
7. "Far-Infrared Spectra and the Ring-Puckering Potential Functions of Silacyclopent-3-ene and Silacyclopent-3-ene-1,1-d<sub>2</sub>." J. Laane, *J. Chem. Phys.*, **50**, 776-782 (1969).
8. "Far-Infrared Spectrum and the Barrier to Pseudorotation of Silacyclopentane." J. Laane, *J. Chem. Phys.*, **50**, 1946-1951 (1969).
9. "Vibrational Spectra and Force Constants for Isotopic Species of Nitrosyl Bromide." J. Laane, L. H. Jones, R. R. Ryan, and L. B. Asprey, *J. Mol. Spectrosc.*, **30**, 485-497 (1969).
10. "Vibrational Spectra and Normal Coordinate Analyses of Silacyclobutanes." J. Laane, *Spectrochim. Acta*, **26A**, 517-540 (1970).
11. "Eigenvalues of the Potential Function  $V = Z^4 \pm BZ^2$  and the Effect of Sixth Power Terms." J. Laane, *Appl. Spectrosc.*, **24**, 73-80 (1970).
12. "Far-Infrared Spectrum and Ring-Puckering Potential of Silacyclopent-2-ene." J. Laane, *J. Chem. Phys.*, **52**, 358-360 (1970).
13. "Combination Band Studies of Some Cyclic Silanes." J. F. Blanke, T. H. Chao, and J.

- Laane, *J. Mol. Spectrosc.*, **38**, 483-494 (1971).
14. "Far-Infrared Spectra of Ring Compounds. VI. Spectrum and Conformation of 1,4-Cyclohexadiene." J. Laane and R. C. Lord, *J. Mol. Spectrosc.*, **39**, 340-344 (1971).
  15. "One-Dimensional Potential Energy Functions in Vibrational Spectroscopy." J. Laane, *Quart. Rev.*, **25**, 533-552 (1971).
  16. "The Isotopic Shift for Vibrations with Potential Energy Barriers." J. Laane, *J. Chem. Phys.*, **55**, 2514-1516 (1971).
  17. "The Rotational Barrier in Metal Sandwich Compounds." J. Laane, *J. Coord. Chem.*, **1**, 75-76 (1971).
  18. "Preparation of Some Cyclic Fluorosilanes." T. H. Chao, S. L. Moore, and J. Laane, *J. Organomet. Chem.*, **33**, 157-160 (1971).
  19. "Vibrational Spectra of Methylene-cyclopentane, Methylene-cyclopentane-2,2,5,5-d<sub>4</sub> and Methylene-d<sub>2</sub>-cyclopentane-2,2,5,5-d<sub>4</sub>." T. B. Malloy, Jr., F. Fisher, J. Laane, and R. M. Hedges, *J. Mol. Spectrosc.*, **40**, 239-261 (1971).
  20. "Periodic Potential functions for Pseudorotation and Internal Rotation." J. D. Lewis, T. B. Malloy, Jr., T. H. Chao, and J. Laane, *J. Mol. Struct.*, **12**, 427-449 (1972).
  21. "Vibrational Analyses of N-Substituted Aziridines. I. Carbonylbis(1-Aziridine)." H. L. Spell and J. Laane, *Spectrochim. Acta*, **28A**, 2950-311 (1972).
  22. "Vibrational Analyses of N-Substituted Aziridines. II. Sulfinylbis(1-Aziridine)." H. L. Spell and J. Laane, *Appl. Spectrosc.*, **26**, 86-92 (1972).
  23. "Vapor-Phase Raman Spectrum and Ring-Puckering Vibration of Cyclopentene." T. H. Chao and J. Laane, *Chem. Phys. Lett.*, **14**, 595-599 (1972).
  24. "Vibrational Analyses of N-Substituted Aziridines. III. 1-Aziridinylcarboxamide-d<sub>0</sub> and -N,N-d<sub>2</sub>." H. L. Spell and J. Laane, *J. Mol. Struct.*, **14**, 39-52 (1972).
  25. "Pseudorotation of Five-Membered Rings." J. Laane, in Vibrational Spectra and Structure, Vol. 1, Marcell Dekker, Inc., J. R. Durig, (ed.), 1972, p. 25-50, 179.
  26. "Normal Coordinate Analyses of Dimethyl Peroxides." M. E. Bell and J. Laane, *Spectrochim. Acta*, **28A**, 2239-2245 (1972).
  27. "Vibrational Analyses of Silacyclopent-3-enes." T.H. Chao and J. Laane, *Spectrochim. Acta*, **28A**, 2443-2463 (1972).
  28. "Vapor-Phase Raman Spectroscopy of Non-Rigid Molecules." J. Laane, Advances in Raman Spectroscopy, Vol. 1, J. P. Mathieu, ed., Heyden & Son, Ltd., 1973, p. 580-4.
  29. "Vibrational Analyses of Silacyclopentanes." D. L. Philen T. H. Chao, and J. Laane, *J. Mol. Struct.*, **16**, 417-431 (1973).

30. "Normal Coordinate Analyses of Trimethylarsine Sulfide and Trimethylarsine Selenide." F. L. Kolar, R. A. Zingaro, and J. Laane, *J. Mol. Struct.*, **18**, 319-334 (1973).
31. "Vibrational Spectra and Ring-Puckering of 2-Cyclopenten-1-ones." T. H. Chao and J. Laane, *J. Mol. Spectrosc.*, **48**, 266-276 (1973).
32. "Detection of Environmental Pollutants Using Laser Raman Spectroscopy." J. Laane and K. Krishnan, Report SAM-73-55, USAF School of Aerospace Medicine, 25 pages (1973).
33. "Raman Spectra and Out-of-Plane Ring Vibrations of Bicyclo[3.1.0]hexane and its Analogs." J. D. Lewis, J. Laane, and T. B. Malloy, Jr., *J. Chem. Phys.*, **61**, 2342-2345 (1974).
34. "Far-Infrared Spectrum and Ring-Puckering of 3-Cyclopenten-1-one." J. D. Lewis and J. Laane, *J. Mol. Spectrosc.*, **53**, 417-427 (1974).
35. "Spectra and Structure of Small Ring Compounds. Part XXX. Microwave Spectrum of 1,1-Difluoro-1-Silacyclopent-3-ene." J. R. Durig, L. A. Carreira, and J. Laane, *J. Mol. Struct.*, **21**, 281-287 (1974).
36. "Vapor-Phase Raman Spectra of Cyclic and Bicyclic Molecules." J. Laane, *Proc. Int. Conf. Ram. Spec.*, **4**, 37 (1974).
37. "Raman Spectra and ring-Puckering of Silacyclobutane-d<sub>0</sub> and -1,1-d<sub>2</sub> and Silacyclopent-3-ene." J. D. Lewis, T. H. Chao, and J. Laane, *J. Chem. Phys.*, **62**, 1932-1935 (1975).
38. "Raman Spectra and Internal Rotation of Methylcyclopropane and Its Analogs." J. R. Villarreal and J. Laane, *J. Chem. Phys.*, **62**, 303-304 (1975).
39. "Vibrational Analysis of 3-Cyclopenten-1-one." J. D. Lewis and J. Laane, *Spectrochim. Acta*, **31A**, 755-763 (1975).
40. "Normal Coordinate Analysis of Trimethylantimony Oxide." W. Morris, R. A. Zingaro, and J. Laane, *J. Organomet. Chem.*, **91**, 295-306 (1975).
41. "Low-Frequency Vibrational Spectra and Ring Puckering of Cyclopentene-d<sub>8</sub>." J. R. Villarreal, L. E. Bauman, J. Laane, W. C. Harris, and S. F. Bush, *J. Chem. Phys.*, **63**, 3727-30 (1975).
42. Book Review: *Vibrational Spectra and Structure. A Series of Advances*. Vol. 4, J. R. Durig, ed., Elsevier Scientific Publishing Co., J. Laane, *J. Organomet. Chem.*, **107**, C31-C33 (1976).
43. "Ring-Puckering Vibrational Spectra of Cyclopentene-1-d<sub>1</sub> and Cyclopent-ene-1,2,3,3-d<sub>4</sub>." J. R. Villarreal, L. E. Bauman, and J. Laane, *J. Phys. Chem.*, **80**, 1172-1177 (1976).
44. "Low Frequency Raman Spectra and Conformational Studies of Cyclic Molecules." J. Laane, J. R. Villarreal, R. M. Irwin, L. E. Bauman, and J. M. Cooke, *Proc. Int. Conf. Ram. Spec.*, **5**, 432 (1976).
45. "Periodic Potential Energy Functions with Sine and Cosine Terms." J. D. Lewis and J.

- Laane, J. Mol. Spectrosc., **65**, 147-154 (1977).
46. "Ring Conformation and Barrier to Inversion of 1,3-Disilacyclobutane from Low-Frequency Vibrational Spectra." R. M. Irwin, J. M. Cooke, and J. Laane, J. Amer. Chem. Soc., **99**, 3273-3278 (1977).
  47. Book Review: Molecular Spectroscopy. Vol. 4, R. F. Barrow, D. A. Long, and J. Sheridan, senior reporters. The Chemical Society, Burlington House. J. Laane, J. Amer. Chem. Soc., **100**, 1645-1646 (1978).
  48. "Low-Frequency Vibrational Spectra and Conformations of Bicyclo[3.2.0]hept-6-ene and 2-Oxabicyclo[3.2.0]hept-6-ene." J. R. Villarreal and J. Laane, J. Chem. Phys., **68**, 3298-3307 (1978).
  49. "Ring-Puckering Combination Band Spectra of 1,3-Disilacyclobutane in the Silicon-Hydrogen Stretching Region." R. M. Irwin and J. Laane, J. Mol. Spectrosc., **70**, 307-313 (1978).
  50. "Vibrational Analysis of 1,1-Disubstituted-1-germacyclopent-3-enes." P. W. Jagodzinski, G. Manuel, and J. Laane, J. Mol. Struct., **49**, 239-248 (1978).
  51. "Vibrational Studies of Cyclopentane. Effect of Ten-Fold Barrier to Pseudorotation." T. H. Chao and J. Laane, J. Mol. Spectrosc., **70**, 357-360 (1978).
  52. "Characterization of the Nitric Oxide Dimer, ONON, Using Resonance Raman Spectroscopy." J. R. Ohlsen and J. Laane, J. Amer. Chem. Soc., **100**, 6948-6955 (1978).
  53. "The Phase-Dependent Conformation and Vibrational Spectra of 1,3- Disilacyclobutane." R. M. Irwin and J. Laane, J. Phys. Chem. **82**, 2845-2850 (1978).
  54. "Phase Dependent Conformation and Ring-Puckering Interactions of 1,3-Disilacyclobutane." R. M. Irwin and J. Laane, Proc. Int. Conf. Ram. Spec., **6**, 36, (1978).
  55. "Characterization of the Asymmetric Nitric Oxide Dimer ONON Using Resonance Raman Spectroscopy and Isotopic Substitution." J. R. Ohlsen and J. Laane, Proc. Int. Conf. Ram. Spec., **6**, 46 (1978).
  56. "Vibrational Spectra and Normal coordinate Analysis of Cyclopentene, Cyclopentene-1-d<sub>1</sub>, Cyclopentene-1,2,3,3-d<sub>4</sub> and cyclopentene-d<sub>8</sub>." J. R. Villarreal, S. F. Bush, W. C. Harris, and J. Laane, Spectrochim. Acta, **35A**, 331-338 (1979).
  57. "Vibrational Spectroscopy." J. Laane, in Modern Techniques in Instrumental Analysis, Wiley-Interscience, E. A. Schweikert and M. J. Brand, eds., 1980, Chapter 2.
  58. "Low-Frequency Vibrational Spectra of Bromo- and Iodobismuthates and the Observation of a Trans Effect." J. Laane and P. W. Jagodzinski, Inorg. Chem., **19**, 44-49 (1980).
  59. "Low-Frequency Vibrational Spectra of Bromo- and Iodo-Antimonates." P. W. Jagodzinski and J. Laane, J. Raman Spectrosc., **9**, 22-27 (1980).
  60. "Ring-Puckering Combination Band Spectra of an Isotopic Impurity, 1,3-

- Disilacyclobutane-1,1,3-3d." P. W. Jagodzinski, R. M. Irwin, J. M. Cooke, and J. Laane, *J. Mol. Spectrosc.*, **84**, 139-145 (1980).
61. "Characterization of Nitrogen Oxides by Vibrational Spectroscopy." J. Laane and J. R. Ohlsen, in Progress in Inorganic Chemistry, John Wiley and Sons, S. J. Lippard, ed., 1980, Vol. **27**, pp. 465-513.
  62. "Isotopic Dilution Studies of the Chloroform-Chloroform-d<sub>1</sub> System by Raman Difference Spectroscopy." J. Laane and W. Kiefer, *J. Chem. Phys.*, **73**, 4971-4975 (1980).
  63. "Spectra and Structure of Organophosphorous Compounds. Microwave Spectra of 3-Phospholene." J. R. Durig, B. J. Streusand, Y. W. Li, L. W. Richardson and J. Laane, *J. Chem. Phys.*, **73**, 5564-5567 (1980).
  64. "Low-Frequency Vibrational Spectra and Ring-Puckering Potential Energy Function of 3-Phospholene and 3-Phospholene-1-d<sub>1</sub>." L. W. Richardson, P. W. Jagodzinski, M. A. Harthcock, and J. Laane, *J. Chem. Phys.*, **73**, 5556- 5563 (1980).
  65. "Determination of Frequency Shifts by Raman Difference Spectroscopy." J. Laane and W. Kiefer, *J. Chem. Phys.*, **72**, 5305-5311 (1980).
  66. "Interference Effects in the High Resolution CARS Spectra of Gases." J. Laane and W. Kiefer, *J. Ram. Spectrosc.*, **9**, 353-360 (1980).
  67. "Comparison of FT-IR and Raman Spectroscopy." W. Kiefer and J. Laane, in Analytical Applications of FT-IR to Molecular and Biological Systems, J. R. Durig, ed., D. Reidel Publishing Co., Boston, 1980, pp. 537- 557.
  68. "Untersuchung der Banden-profile hochaufgeloster CARS-Spektren von Molekullen in der Gasphase." J. Laane and W. Kiefer, *Verhandl. DPG (VI)*, **15**, 658 (1980).
  69. "Anwendungen der Differenz-Ramanspektroskopie." J. Laane and W. Kiefer, *Verhandl. DPG (VI)*, 659 (1980).
  70. "The Determination of Small-Frequency Shifts by Raman Difference Spectroscopy." J. Laane and W. Kiefer, *Proc. Int. Conf. Ram. Spec.*, **7**, 340- 341 (1980).
  71. "CARS Spectroscopy of Gases." P. Baierl, J. Laane, M. Eichele, and W. Kiefer, *Proc. Int. Conf. Ram. Spec.*, **7**, 648-651 (1980).
  72. "Precise Measurement of Small Isotopic Shifts with Raman difference Spectroscopy." J. Laane, H. Eichele, H. P. Hohenberger, and W. Kiefer, *J. Mol. Spectrosc.*, **86** 262-265 (1981).
  73. "Measurement of Solvent Shifts by Raman Difference Spectroscopy." J. Laane and W. Kiefer, *Appl. Spectrosc.*, **35**, 267-271 (1981).
  74. "Applications of a Four-Channel Raman Difference Spectrometer." J. Laane and W. Kiefer, *Appl. Spectrosc.*, **35**, 428-432 (1981).
  75. "Coherent anti-Stokes Raman-Spectroscopy Studies of Nitric Oxide." A. Beckmann, H.

- Fietz, W. Kiefer, and J. Laane, *Phys. Rev. A.*, **24**, 2518-2522 (1981).
76. "A Four-Channel Photon-Counter for Raman Spectroscopy." H. Eichele, G. Kolb, J. Laane, A. Beckmann, and W. Kiefer, *J. Phys. E: Sci. Instrum.*, **14**, 1397-1402 (1981).
77. "Determination of Bandwidth and Frequency Changes by Raman Difference Spectroscopy." J. Laane, *J. Chem. Phys.*, **75**, 2539-45 (1981).
78. "Cars Studies of Nitric Oxide." A. Beckmann, H. Fietz, J. Laane, and W. Kiefer, *Verhandl. DPG (VI)*, **16**, E47 (1981).
79. "Vector Representation of Large Amplitude Vibrations for the Determination of Kinetic Energy Functions." J. Laane, M. A. Harthcock, P. M. Killough, L. E. Bauman, and J. M. Cooke, *J. Mol. Spectrosc.*, **91**, 286-299 (1982).
80. "Calculation of Kinetic Energy Terms for the Vibrational Hamiltonian: Application to Large Amplitude Vibrations Using One-, Two-, and Three-Dimensional Models." M. A. Harthcock and J. Laane, *J. Mol. Spectrosc.*, **91**, 300-324 (1982).
81. "The Two-Dimensional Potential Energy Surface for the Ring-Puckering and Ring-Twisting of Cyclopentene-d<sub>0</sub>, -1-d<sub>1</sub>, -1,2,3,3-d<sub>4</sub>, and d<sub>8</sub>." L. E. Bauman, P. M. Killough, J. M. Cooke, J. R. Villarreal, and J. Laane, *J. Phys. Chem.*, **86**, 2000-2006 (1982).
82. "The Three-Dimensional Potential Energy Surface for the Ring-Puckering, Ring-Deformation, and SiH<sub>2</sub> Rocking Vibrations of 1,3-Disilacyclobutane." P. M. Killough, R. M. Irwin, and J. Laane, *J. Chem. Phys.*, **76**, 3890-3898 (1982).
83. "Conformational Study of Molecules with Asymmetric Isotopic Substitution: Ring-Puckering of 1-Silacyclobutane-1-d<sub>1</sub>." M. A. Harthcock, J. M. Cooke, and J. Laane, *J. Phys. Chem.*, **86**, 4335-4342 (1982).
84. "Evaluation of Pseudopotential Terms for the Vibrational Hamiltonian of Small Ring Molecules." M. A. Harthcock and J. Laane, *J. Mol. Spectrosc.*, **94**, 461-2 (1982).
85. "Applications of Two- and Four-Channel Raman Difference Spectroscopy." J. Laane and M. M. Strube, *Raman Spectroscopy, Linear and Non-Linear*, J. Lascombe and P. V. Huang, eds., J. Wiley and Sons, 1982, pp 251-252.
86. "Interconversion Studies and Characterizations of Asymmetric and Symmetric Dinitrogen Trioxide in Nitric Oxide Matrices by Raman and Infrared Spectroscopy." E. M. Nour, L.-H. Chen, and J. Laane, *J. Phys. Chem.*, **87**, 1113-1120 (1983).
87. "Raman Spectra of Cl<sub>3</sub><sup>+</sup>, Br<sub>3</sub><sup>+</sup>, and ONON at 12 K from the Reaction of NO with HCl or HBr." L.-H. Chen, E. M. Nour, J. Laane, *J. Ram. Spectrosc.*, **14**, 232-235 (1983).
88. "Applications of Raman Difference Spectroscopy." J. Laane and M. M. Strube, *Bull. Am. Phys. Soc.*, **28**, 198 (1983).
89. "Raman Difference Spectroscopy." J. Laane, in *Vibrational Spectra and Structure*, Vol. 12, Elsevier, J. R. Durig (ed.), 1983, p. 405-467.



90. "Measurement of Frequency Shifts Using Infrared or Raman Spectroscopy." J. Laane, *Appl. Spectrosc.*, **37**, 474-475 (1983).
91. "Vibrational Spectra and Force Constants for trans-Sodium Hyponitrite." L. -H. Chen and J. Laane, *J. Ram. Spectrosc.*, **14**, 284-287 (1983).
92. "Two-Dimensional Analysis of the PH Inversion and Ring-Puckering Vibrations of 3-Phospholene." M. A. Harthcock and J. Laane, *J. Chem. Phys.*, **79**, 2103-2113 (1983).
93. "Barrier to Internal Rotation of the Silyl Group in Cyclopropylsilane From Combination Band Spectra." J. Laane, E. M. Nour, and M. Dakkouri, *J. Mol. Spectrosc.*, **102**, 368-371 (1983).
94. "Raman Spectra and Force Constants for the Nitric Oxide Dimer and its Isotopic Species." E. M. Nour, L. H. Chen, M. M. Strube, and J. Laane, *J. Phys. Chem.*, **88**, 756-759 (1984).
95. "Low-Frequency Vibrational Spectra and Ring-Puckering Potential Energy Function of 2-Phospholene and 2-Phospholene-1-d<sub>1</sub>." M. A. Harthcock, J. R. Villarreal, L. W. Richardson, and J. Laane, *J. Phys. Chem.*, **88**, 1365-1368 (1984).
96. "Raman Difference Spectroscopy of Aqueous Nitrate Solutions." J. Laane and M. M. Strube, *Bull. Am. Phys. Soc.*, **29**, 43 (1984).
97. "The Two-Dimensional Potential Energy Surface for the Ring-Puckering and Ring-Twisting of 1-Silacyclopent-3-ene-d<sub>0</sub>, 1-d<sub>1</sub>, and 1,1-d." P. M. Killough and J. Laane, *J. Chem. Phys.*, **80**, 5475-5548 (1984).
98. "Application of Raman Spectroscopy to Structural and Conformational Problems." J. Laane, in Advances in Multiphoton Processes and Spectroscopy, Vol. 1, World Scientific, S. H. Lin (ed.), 1984, p 329-424.
99. "Two- and Three-Dimensional Potential Energy Surfaces for Small Ring Molecules." J. Laane, *J. Mol. Struct.*, **126**, 99-110 (1984).
100. "Low-Frequency Raman Spectra and Ring-Inversion Potential Energy Function of 2-Phospholene and Related Five-Membered Ring Molecules." J. Laane, M. A. Harthcock, J. R. Villarreal, and L. W. Richardson, *Proc. Int. Conf. Ram. Spectrosc.*, **9**, 582 (1984).
101. "Calculation of Two-Dimensional Vibrational Potential Energy Surfaces Utilizing Prediagonalized Basis Sets and Van Vleck Perturbation Methods." M. A. Harthcock and J. Laane, *J. Phys. Chem.*, **89**, 4231-4240 (1985).
102. "Microwave Inversion - Rotation Spectrum of 1,3-Disilacyclobutane- 1,1,3,3-d<sub>4</sub>." T. Kubota, K. Ueda, T. Tanaka, and J. Laane, *J. Mol. Spectrosc.*, **114**, 2345 (1985).
103. "Vibrational Spectra and Structure of 4-Silaspiro(3,3)heptane." J. M. Cooke and J. Laane, *Spectrochim. Acta*, **42A**, 335-337 (1986).
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