

William Burns

Chair, Department of Chemistry and Physics
wburns@astate.edu

Current Position

Position Title: Chair, Department of Chemistry and Physics
Current Academic Rank: Associate Professor
Rank Since: Fall 2002

Degrees

Ph.D. Chemistry, University of Minnesota, Minneapolis, Minnesota 1996
B.S. Chemistry, Drake University, Des Moines, IA 1987

Scholarly Contributions and Creative Productions

Grants

Burns, W. (2012). Recitation Pilot Program for General Chemistry. Arkansas State University - \$2000.

Warby, R., Benjamin, E., Koizumi, H., Burns, W., Ali, H., & Rougeau, B.L. (2011). National Center for Science and Civic Engagement Post-Institute Implementation SENCER NSF 2010-2012 Sub-Awards. SENCER NSF - \$3000. [Funded Status: Funded]

Burns, W., Allen, S., Johnson, B., & Reeve, S. (2009). Standoff Explosives Detection. Dept of Defense contract W909MY-09-C-0001 - \$6032114. [Funded Status: Funded], my involvement ended Oct 2012.

Burns, W., Johnson, B., Reeve, S., & Allen, S. (2005). DOD contract W39113M-05-C-0158. - \$5560000. [Funded Status: Funded]

Benjamin, E., Burns, W., Trautwein, J., & Grady, J. (2009). Concepts in Chemistry. Arkansas Science and Technology Authority - 300000. [Funded Status: Funded ~~N/A~~]

"Near Real-Time Monitoring of Gas Phase Atmospheric Species" Arkansas State University Faculty Research Proposal, \$4370, 8/04-7/05.

"A Novel Application of Tunable Diode Laser Absorption Spectroscopy: A Real Time Analysis of Constituents of Environmental Tobacco Smoke" Arkansas State University Arkansas Biosciences Institute, \$75,000, 1/04 – 12/04.

"A Novel Application of Tunable Diode Laser Absorption Spectroscopy: The Fast and Accurate Analysis of Gas Phase Constituents of Environmental Tobacco Smoke" Arkansas State University Arkansas Biosciences Institute, \$149,727, 1/03 – 12/03.

"Computational Investigations of OC-X (X = BH₃, BF₃, SO₃)" SILO Advisory Council, \$3300, November, 2001.

"Spreadsheets for Arkansas Science and Math Teachers" Dwight D. Eisenhower Professional Development Program administered by the Arkansas Departments of Education and Higher Education, \$30958, November 2000 (co-PI, Dr. Scott Reeve, ASU, Department of Chemistry).

"Constructing Chemistry Understanding 2000" Dwight D. Eisenhower Professional Development Program administered by the Arkansas Departments of Education and Higher Education, \$50047, November 2000 (co-PI, Dr. Scott Reeve, ASU, Department of Chemistry).

"Infrared Spectroscopic Investigation of Donor-Acceptor Complexes Exhibiting Significant Gas-Crystal Phase Structure Differences" SILO Advisory Council, \$3300, November 2000.

"Computational Chemistry" ASU College of Arts and Sciences Deans Research Award, \$320, April 2000.

"Spectroscopic Investigation of Cigarette Smoke." ASU College of Arts and Sciences Dean's Research Award, February 1999, \$400.

"Chemistry/Biology/Freshman English Learning Community Pilot Proposal" ASU Retention Review Task Force, April 1999, \$500.

"Construction of a Computer Automated Solution Calorimeter" ASU College of Arts and Sciences Spring 1999 Professional Development Fund, May 1999, \$419.

"A Spectroscopic and Computational Investigation of Donor-Acceptor Complexes" ASU Faculty Research Grant, May 1999, \$2100.

"Computational Investigation of Donor-Acceptor Complexes" ASU College of Arts and Sciences Dean's Research Award, September 1999, \$400.

"Special Research Grants for Fall Semester: Infrared Spectroscopic Investigations of Large Gas Phase - Crystal Phase Structure Differences in Donor-Acceptor Complexes" ASU, November 1997, \$2340.

"Productivity Enhancement Funds: Modernization of General Chemistry Laboratory Curricula", ASU, October 1997, \$17873.

Journal Publications

Tanjaroorn, C., Reeve, S., Ford, A.R., Murry, W.D., Lyon, K., Yount, B., Britton, D., Burns, W., Allen, S., & Johnson, B. (2012). Picosecond Rotationally Resolved Stimulated Emission Pumping Spectroscopy of Nitric Oxide. *Chem. Phys.*, 393, 80-85.

Osborn, T., Burns, W., Green, J., & Reeve, S. (2012). An Optical Nose Approach to Explosive Detection: One Strategy for Optically Based Explosive Sensing. *Spectroscopy*, 26(1), 34-45.

Arora, T., Ali, H., Burns, W., Koizumi, E., & Koizumi, H. (2011). Theoretical and ATR-FTIR Study of Free 12-Crown-4 in Aqueous Solution. *Chemical Physics Letters*, 502(4-6), 253-258.

Bryant, M., Reeve, S., & Burns, W. (2008). The Observation and Analysis of Rotation-Vibration Spectra of N₂O: A physical chemistry laboratory experiment. *Journal of Chemical Education*, 85(1), 121-124.

Burnett, J., & Burns, W. (2006). Using a Spreadsheet to Fit Experimental pH Titration Data to a Theoretical Expression: Estimation of Analyte Concentration and K_a. *Journal of Chemical Education*, 83, 1190.

"Infrared Laser Spectroscopy of Jet Cooled Cobalt Tricarbonyl Nitrosyl" K. S.

Trauth, W. A. Burns, G. Berry, S. W. Reeve, *J. Chem. Phys.*, **120**, 4297, (2004).

"Rotational Analysis of FTIR Spectra from Cigarette Smoke: An Application of Chem Spec II in the undergraduate Research Laboratory" A. R. Ford, W. A. Burns, S. W. Reeve, *J. Chem. Ed.*, **81**, 865, (2004).

"Partially Formed Bonds in HCN-SO₃ and CH₃CN-SO₃: A Comparison Between Donor-Acceptor Complexes of SO₃ and BF₃" W. A. Burns, J. A. Phillips, M. Canagaratna, H. Goodfriend, K. R. Leopold, *J. Phys. Chem. A*, **103**, 7445 (1999).

General Chemistry I Laboratory Manual, revision 3, W. Burns and L. Jones, McGraw-Hill, Dubuque, IA, 1999.

"Quadrupole Coupling Constants for ³³SO₃: Microwave Measurements for Ar-³³SO₃ and Ab Initio Results for the ³³SO₃ Monomer" D. L. Fiacco, B. Kirchner, W. A. Burns, K. R. Leopold, *J. Mol. Spec.*, **191**, 389, (1998).

"Accurate Spectroscopic Constants for the Ground Vibrational State of Methyl Isocyanide-d₃, CD₃NC" W. A. Burns, K. R. Leopold, A. D. de Winter, M. D. Marshall, *J. Mol. Spec.*, **181**, 224, (1997).

"Microwave and Millimeter-Wave Spectra of the Mixed Deuterated-Protonated Water-Dimer Isotopomers" G. T. Fraser, F. J. Lovas, R. D. Suenram, E. N. Karyakin, A. Grushow, W. A. Burns, K. R. Leopold, *J. Mol. Spec.*, **181**, 229, (1997).

"Dipole Moment of the Lowest Pi Bending State of (HCN)₂" A. Grushow, W. A. Burns, K. R. Leopold, *J. Mol. Spec.*, **170**, 335, (1995).

"Determination of the Three-fold Internal Rotation Barrier in Ar-NH₃" A. Grushow, W. A. Burns, S. W. Reeve, M. A. Dvorak, K. R. Leopold, *J. Chem. Phys.*, **100**, 2413, (1994).

"Unusually Large Gas-Solid Structure Differences: A Crystallographic Study of HCN-BF₃" W. A. Burns, K. R. Leopold, *J. Am. Chem. Soc.*, **115**, 11622, (1993).

"Microwave Spectra and Structure of HCN-BF₃: An Almost Weakly Bound Complex" S. W. Reeve, W. A. Burns, F. J. Lovas, R. D. Suenram, K. R. Leopold, *J. Phys. Chem.*, **97**, 10630, (1993).

"Far Infrared Spectroscopy of the (0,1¹,0) State of Ar-D³⁵Cl" S. W. Reeve, M. A. Dvorak, A. Grushow, W. A. Burns, K. R. Leopold, *J. Mol. Spec.*, **153**, 252, (1992).

"Observation of Three Intermolecular Vibrational States of Ar-HF" M. A. Dvorak, S. W. Reeve, W. A. Burns, A. Grushow, K. R. Leopold, *Chem. Phys. Lett.*, **185**, 399, (1991).

Presentations

Welsh, J., Burns, W., Clark, B. (2013) When Accuracy and Precision Meet Reliability and Validity. 2013 Association for the Assessment of Learning in Higher Education (AALHE) Annual Conference, June 5, 2013.

Reeve, S., Clasp, T.N., Kaimal, S., & Burns, W. (2010). Analysis of rotational structure in the 710 cm⁻¹ band of isobutylene. Joint 66th SWRM and 62nd SE Regional Meeting of the ACS 2010.

Arora, T., Ali, H., Burns, W., & Koizumi, H. (2010). Interaction of 12c4 with alkali metal cation in aqueous solution: Theoretical investigation using polarized continuum model. Fall 2010 National Meeting & Exposition.

Draganjac, M., Johnson, T., Burns, W., & Reeve, S. (2010). IR Spectrum of NO. 15th Meeting, Midsouth Inorganic Chemists Association.

Johnson, B., Reeve, S., Burns, W., & Allen, S. (2010). Optical Detection of Special Nuclear Materials: an alternative approach for standoff and remote sensing. SPIE Defense, Security, and Sensing.

Draganjac, M., Burns, W., Kennon, J.T., Panigot, M., Ontko, A., Koizumi, H., Warby, R., Cron, S., & Rougeau, B.L. (2010). Pre- and post-assessment of general chemistry students. 240th ACS National Meeting.

Arora, T., Ali, H., Burns, W., Koizumi, E., & Koizumi, H. (2010). Theoretical and Experimental study of 12-Crown-4 in Aqueous Phase. MICA Meeting.

Arora, T., Ali, H., Burns, W., Koizumi, E., & Koizumi, H. (2010). Theoretical and Experimental study of 12-Crown-4 in Aqueous Phase. INBRE Research Conference Fall 2010-

Sullivan, M., Burns, W., & Reeve, S. (2008). A Low Cost Raman Spectrometer. 64th Southwest Regional ACS Meeting.

Green, J., Burns, W., & Reeve, S. (2008). Development of Synthetic Spectra to Aid in the Analysis of High Resolution Infrared Spectra. 64th Southwest Regional ACS meeting.

Kaimal, S., Osborn, T., Burns, W., & Reeve, S. (2008). High resolution infrared spectroscopy of the CH stretching bands in acetaldehyde. 64th Southwest Regional ACS meeting.

Osborn, T., Kaimal, S., Causey, J., Ford, A., Burns, W., & Reeve, S. (2008). High Resolution Spectral Signatures for TNT-based Explosives. 64th Southwest Regional ACS Meeting.

Kennon, J.T., Burns, W., Draganjac, M., Redeker, K., Dowling, C., Cron, S., Rougeau, B., & Bryant, M. (2008). Pre- and post-assessment of general chemistry students. 235th National ACS meeting.

Reeve, S., Burns, W., Osborn, T., Kaimal, S., & Ford, A. (2008). Rotationally resolved spectral signatures for volatile impurities in TNT-based explosives. SPIE Defense and Security.

"Spectral Signatures of Explosives in the 3 Micron Region" S. Kaimal, T. Osborn, S. Reeve, W. Burns SPIE Defense-Security Conference, 6945-42, March 17-20, 2008, Orlando, FL

Reeve, S., Burns, W., Ford, A.R., Osborn, T., & Kaimal, S. (2007). Molecular Spectroscopic Measurements of VOC found in Explosive Vapors. FACSS.

"Observation and Analysis of CO₂ Rovibrational Spectra in the Physical Chemistry Laboratory" William A Burns, Scott W Reeve, Lynn A Heard, Anh Nguyen; Talk 325 of the 61st Southwest and the 57th Southeast Joint Regional Meetings of the American Chemical Society, November 3, 2005, Memphis, TN.

"The Observation and Analysis of Rotation Vibration Spectra of N₂O: A Physical Chemistry Laboratory Experiment" Mark S. Bryant, Scott W Reeve, William A

Burns; Talk 326 of the 61st Southwest and the 57th Southeast Joint Regional Meetings of the American Chemical Society, November 3, 2005, Memphis, TN.

"FT-IR Rotation Vibration Spectra of Carbon Dioxide" Anh Nguyen, S.W. Reeve, W. A. Burns; Poster 616 of the Division of Chemical Education 229th American Chemical Society National Meeting, March 13-17, 2005, San Diego, CA.

"Near Real-time Monitoring of Gas Phase Atmospheric Species" Anh Nguyen, S.W. Reeve, W. A. Burns; Poster 638 of the Division of Chemical Education 229th American Chemical Society National Meeting, March 13-17, 2005, San Diego, CA.

"Infrared Diode Laser Spectroscopy of Pyridine in a Jet and a 200 m Herriott Cell" K. S. Trauth, G. M. Berry, W. A. Burns, S. W. Reeve, 38th Midwest Regional Meeting of the American Chemical Society, Columbia, MO, November 6, 2003,.

"Infrared Diode Spectroscopy at Arkansas State University, K. S. Trauth, G. M. Berry, W. A. Burns, S. W. Reeve, 2003 BRIN Research Symposium, September 19, 2003, Fayetteville, AR, poster.

"Rotational Analysis of Several Vibrational Bands of Cobalt Tricarbonyl Nitrosyl" K. S. Trauth, W. A. Burns, S. W. Reeve, 87th Annual Meeting of the Arkansas Academy of Science, April 4, 2003, Fayetteville, AR.

"Infrared Diode Laser Spectroscopy of Jet Cooled Organometallics, K. S. Trauth, W. A. Burns, S. W. Reeve, 225th National Meeting of the American Chemical Society, March 26, 2003, New Orleans, LA, poster.

"Fitting Experimental pH Titration Data to a Theoretical Expression: Estimation of Analyte Concentration and Ka" John Burnett, William Burns, 225th National Meeting of the American Chemical Society, March 23, 2003, New Orleans, LA, poster.

"Infrared and Computational Investigations of the CH₃CN-BF₃ Donor-Acceptor Complex" Trent Franks, William Burns, 2002 Undergraduate Research Conference, April 19-20, 2002, Arkadelphia, AR.

"Computational Investigations of OC-X (X = BH₃, BF₃, SO₃)" Keith Clem, William Burns, 2002 Undergraduate Research Conference, April 19-20, 2002, Arkadelphia, AR.

"Some Unexpected Properties of the Donor-Acceptor Complex CH₃CN-BF₃" Invited talk Lyon College Department of Chemistry, November 28, 2001.

"Some Unexpected Properties of the Acetonitrile-Boron Trifluoride Complex" Invited talk University of Memphis Department of Chemistry, February 22, 2002.

"Computational Investigation of Nitrogen-Boron Donor-Acceptor Complexes" Leon Thornton, William Burns, 220th National Meeting of the American Chemical Society, August 21, 2000, Washington, DC, poster.

"Computational Chemistry: Using Gaussian 98W" Leon Thornton, William Burns, 84th Annual Meeting of the Arkansas Academy of Science, April 7, 2000,

Hot Springs, AR, poster.

"A Rotational-Vibrational Analysis of Several Components of Tobacco Smoke: An Undergraduate Physical Chemistry Experiment" 1999 Sigma Xi Forum, November 4-5, 1999, Minneapolis, MN, poster.

"Analyzing Cigarette Smoke Using Infrared Spectroscopy" Richard Lester, William Burns, 218th National Meeting of the American Chemical Society, August 24, 1999, New Orleans, LA, poster.

"Calculation of Vibrational Frequencies Using Mathcad" 215th American Chemical Society National Meeting, April 1, 1998, Dallas, TX.

"Experimental Observation of Some Unexpected Physical Properties in Nitrogen-Boron and Nitrogen-Sulfur Containing Complexes" Arkansas State University Sigma Xi Chapter, October 15, 1997.

"Structure Correlation: General Chemistry Revisited" Arkansas State University American Chemical Society Chemistry Club Seminar, March 27, 1995.

"The Microwave Structure of HCN-SO₃ and CH₃CN-SO₃" 50th Annual Ohio State University Symposium on Molecular Spectroscopy, J. Phillips, M. Canagaratna, H. Goodfriend, Wm. Burns, K. Leopold, TB08, June 13, 1995.

"Determination of the Structure of HCN-BF₃" 47th Annual Ohio State University Symposium on Molecular Spectroscopy, S. W. Reeve, W. A. Burns, F. J. Lovas, R. D. Suenram, K. R. Leopold, R08, June 15, 1992.

Proceedings Publications

"Measurement of ammonia skin gas using a mid-infrared Pb-salt tunable diode laser" T. Clasp, S. Kaimal, S. W. Reeve, W. A. Burns *Proceedings of SPIE*, 665(Cheical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Sensing XI), 766518/1-766518/7, (2010).

"Optical detection of special nuclear materials: an alternative approach for standoff and remote sensing" J. B. Johnson, S. W. Reeve, W. A. Burns, S. D. Allen *Proceedings of SPIE*, 7665(Cheical, Biological, Radiological, Nuclear, and Explosives (CBRNE) Sensing XI), 76651L/1-76651L/7, (2010).

Osborn, T., Kaimal, S., Causey, J., Burns, W., & Reeve, S. (2009). Optical Detection of Explosives: Spectral Signatures from the Explosive Bouquet. *Proceedings of SPIE*, 7304, 730419/1 - 730419/8.

"Spectral Signatures for RDX Based Explosive in the 3 Micron Region" T. Osborn, S. Kaimal, S. W. Reeve, W. Burns, *Proceedings of SPIE*, 6945 (Optics and Photonics in Global Homeland Security IV), 69451S/1-69451S/11, (2008).

"Spectral Signatures for Volatile Impurities of TNT and RDX Based Explosives" T. Osborn, S. Kaimal, W. Burns, A. R. Ford, S. W. Reeve, *Proceedings of SPIE*, 6945 (Optics and Photonics in Global Homeland Security IV), 69451B/1-69451B/11, (2008).

Institutional Committees

University

Chairs Council (University) Fall 2011 - Present

Other Institutional Service

(Committee Chair) Coordinator of General Chemistry Lecture (University) Fall 2006 - Summer 2012

Teaching

Fall 2006 Courses:

CHEM 1023 002 - General Chemistry
II

Spring 2007 Courses:

CHEM 2002 001 - Computers in Chemistry
CHEM 3154 001 - Survey of Physical
Chemistry

Fall 2007 Courses:

CHEM 1013 001 - General Chemistry I
CHEM 1013 101 - GENERAL CHEMISTRY I

Spring 2008 Courses:

CHEM 2002 001 - Computers in Chemistry
CHEM 3154 001 - Survey of Physical
Chemistry

Fall 2008 Courses:

CHEM 1013 002 - General Chemistry I
CHEM 427V 010 - RESEARCH IN CHEMISTRY

Spring 2009 Courses:

CHEM 2002 001 - Computers in Chemistry
CHEM 3154 001 - Survey of Physical
Chemistry

Summer 2009 Courses:

CHEM 6343 2 - SP TOP CONCEPTS IN CHEMISTRY

Fall 2009 Courses:

CHEM 1023 001 - General Chemistry
II

Spring 2010 Courses:

CHEM 1023 001 - General Chemistry
II
CHEM 1023 002 - General Chemistry
II
CHEM 1023 003 - General Chemistry
II

Fall 2010 Courses:

CHEM 1013 002 - General Chemistry
I

Spring 2011 Courses:

CHEM 1013 001 - General Chemistry I

CHEM 1023 001 - General Chemistry
II

CHEM 4393 001 - Special Problems

Fall 2011 Courses:

CHEM 1013 002 - General Chemistry I

CHEM 1023 001 - General Chemistry
II

Spring 2012 Courses:

CHEM 1011 001 - General Chemistry I Laboratory

CHEM 1013 002 - General Chemistry I

CHEM 1023 H02 - HNRS GENERAL CHEMISTRY II

Fall 2012 Courses:

CHEM 1013 002 - GENERAL CHEMISTRY I