

CHARLES S. JOHNSON, JR., Smith Professor of Chemistry

CURRICULUM VITAE

Personal History

Born in Albany, GA, March 7, 1936

Education:

B.S., Georgia Institute of Technology, 1958

Ph.D., Massachusetts Institute of Technology, 1961

Professional Experience:

University of Illinois (Urbana):

Instructor of Physical Chemistry, 1962

Yale University:

Assistant Professor of Chemistry, 1962-1966

Associate Professor of Chemistry, 1967

University of North Carolina at Chapel Hill:

Professor of Chemistry, 1967-1988

Director of Graduate Studies in Chemistry, 1975-1980

Chairman, Laser Laboratory Committee, 1974-1980

Administrative Board of the Graduate School, 1980-1985

Acting Chairman, Department of Chemistry, 1980-1981

William R. Kenan, Jr. Chemistry Endowment Committee, 1980-1982

Morehead Graduate Fellowship Selection Committee, 1979, 1980, 1981

Chairman, Departmental Computer (Network) Committee, 1982-1995

Chairman, Task Group for Optimal Organization of the University for Research, 1984 (UNC Self Study)

Mary Ann Smith Professor of Chemistry 1988-

Chairman, Five Year Planning Committee - UNC Chemistry Dept., 1989

College Planning Committee 1994

Department Vice-Chair for Technical Personnel 1995-1998

College Committee on Endowed Chairs 1995-1996

Copyrights and Fair Use Committee 1997

Chairman, Department Post-Tenure Review Committee 2001-

Affiliations:

American Physical Society, American Chemical Society, American Association for the Advancement of Science, American Federation of Scientists

Honors and Professional Recognitions:

New York Community Trust Scholarship, 1956-57 (Georgia Tech)

Metropolitan Foundation Scholarship, 1957-58 (Georgia Tech)

Atlanta Rotary Club Scholarship Award, 1958 (Georgia Tech)
Phi Kappa Phi Scholarship Cup, 1958 (Georgia Tech)
Louisiana Branch A.I.C. Student Award, 1958 (Georgia Tech)
NSF Graduate Fellowships, 1958-59, 1959-60, 1960-61 (M.I.T.)
NAS-NRC Postdoctoral Fellowship, 1961-62 (Illinois)
Yale Faculty Fellowship, 1966-67 (Yale)
Alfred P. Sloan Research Fellowship, 1966-72 (Yale-U.N.C.)
John Simon Guggenheim Fellowship, 1972-73 (U.N.C.)
Elected Fellow of the American Physical Society, 1975 (U.N.C.)
Awarded Kenan Research Leave for 1986 U.N.C.)
Elected Fellow of American Association for the Advancement of Science, 1991 (U.N.C.)
Awarded Reynolds Research Leave for 1998 (U.N.C.)

Selected Professional Activities:

Editorial Board of the Journal of Magnetic Resonance, 1971-1999
Organizer, ACS Symposium on Dynamic Light Scattering, Anaheim, 1978
Program Chairman for Physical Chemistry for the Southeast-Southwest ACS Regional Meeting, New Orleans, 1980
Alternate Councilor, Division of Physical Chemistry (ACS), 1982-1983.
Member, Oversight Committee for Chemistry Division of NSF, 1982.
Member of ACS Task Group to review J. Phys. Chem. - 1991
Chairman of Magnetic Resonance Spectroscopy Discussion Group (MRSG, an ACS Subsection in the Research Triangle Area) - 1991
Director MRSG, 1992-1995
ChemTracts, Invited Contributing Scholar 1989-1992

Publications: 2023

- R001 Nuclear Spin Relaxation in Gases, C.S. Johnson, Jr., Ph.D. Thesis M.I.T. (1961). pp. 92.
- R002 Nuclear Resonance Spectra of Allyllithium and Vinylithium, C.S. Johnson, Jr., M.A. Weiner, J.S. Waugh, and D. Seyferth, J. Am. Chem. Soc., **83**, 1306-1307 (1961).
- R003 On the Mechanism of Nuclear Relaxation in Gaseous and Liquid CHF_3 , C.S. Johnson, Jr., J.S. Waugh, and J.N. Pinkerton, J. Chem. Phys., **35**, 1128-1129 (1961).
- R004 Nuclear Relaxation in Gases: Mixtures of Methane and Oxygen, C.S. Johnson, Jr. and J.S. Waugh, J. Chem. Phys., **35**, 2020-2024 (1961).
- R005 Nuclear Relaxation in Adulterated Hydrogen, C.S. Johnson, Jr. and J.S. Waugh, J. Chem. Phys., **36**, 2266-2272 (1962).
- R006 E.S.R. Spectrum and Spin Densities for the Biquarternary Bipyridyl Radical Cation, C.S. Johnson, Jr., R.E. Visco, H.S. Gutowsky, and A.M. Hartley, J. Chem. Phys., **37**, 1580-1982 (1962).

- R007 Nuclear Relaxation and Intermolecular Forces in Gases, J.S. Waugh and C.S. Johnson, Jr., *Disc. Faraday Soc.*, **34**, 191-198 (1962).
- R008 High Resolution ESR Spectra of Photochemically Generated Free Radicals: The Viologens, C.S. Johnson, Jr. and H.S. Gutowsky, *J. Chem. Phys.*, **39**, 58-62 (1963).
- R009 Nuclear Transverse Relaxation in Electron Transfer Reactions, C.S. Johnson, Jr., *J. Chem. Phys.*, **39**, 2111-2114 (1963).
- R010 Effects of Electron Transfer on High-Resolution NMR Spectra, C.S. Johnson, Jr. and J.C. Tully, *J. Chem. Phys.*, **40**, 1744-1750 (1964).
- R011 On the Calculation of Nuclear Magnetic Resonance Spectra for Coupled Nuclear Spins in Intramolecular Reactions, C.S. Johnson, Jr., *J. Chem. Phys.*, **41**, 3277-3278 (1964).
- R012 ESR Spectrum and Barrier to Internal Rotation for the Stilbene Anion Radical, R. Chang and C.S. Johnson, Jr., *J. Chem. Phys.*, **41**, 3272-3274 (1964).
- R013 Chemical Rate Processes and Magnetic Resonance, C.S. Johnson, Jr., in Advances in Magnetic Resonance, Vol. I, Ed. J.S. Waugh, (Academic Press, Inc., New York, 1965). (p.33-102)
- R014 Magnetic Resonance Studies of Hyperfine Interactions in the Anion Radicals of Stilbene and Related Radicals, C.S. Johnson, Jr. and R. Chang, *J. Chem. Phys.*, **43**, 3183-3192 (1965).
- R015 Exact Calculation of Spin-Echo Decays by Numerical Integration of Modified Bloch Equations, C.S. Johnson, Jr. and M. Saunders, *J. Chem. Phys.*, **43**, 4170-4171 (1965).
- R016 Direct Distinction between Ions and Ion-Pairs in Electron Transfer Reactions by Means of Electron Spin Resonance, R. Chang and C.S. Johnson, Jr., *J. Am. Chem. Soc.*, **88**, 2338-2339 (1966).
- R017 Line Widths and Second-Order Structure in the ESR Spectra of Some Biquarternary Pyrazine Radicals, M.K. Ahn and C.S. Johnson, Jr., *Magnetic Resonance and Relaxation (Proc. of the XIVth Colloque Ampere)* Edited by R. Blinc, (North-Holland Publ. Co., Amsterdam, 1967) p. 253-261.
- R018 Triarylmethyl Radicals: Synthesis and EPR Studies of Sesquixanthryl Dimer and Related Compounds, M.J. Sabacky, C.S. Johnson, Jr., R.G. Smith, H.S. Gutowsky, and J.C. Martin, *J. Am. Chem. Soc.*, **89**, 2054-2058 (1967).
- R019 The Theory of Line Widths and Shifts in Electron Spin Resonance Arising from Electron Spin-Exchange Interactions, C.S. Johnson, Jr., *Mol. Phys.*, **12**, 25-31 (1967).
- R020 ESR Studies of Electron Transfer: Trans-Stilbene - Stilbene[□] System, R. Chang and C.S. Johnson, Jr., *J. Chem. Phys.*, **46**, 2314-2316 (1967).

- R021 Mathematical Description of Magnetic Resonance for Spins that Move, C.S. Johnson, Jr., *Am. J. Phys.*, **35**, 929-933 (1967).
- R022 A Monte Carlo Calculation of Magnetic Resonance for Spins in Motion, M. Saunders and C.S. Johnson, Jr., *J. Chem. Phys.*, **48**, 534-536 (1968).
- R023 Nuclear Spin Relaxation in Acetylene Gas, M.K. Ahn and C.S. Johnson, Jr., *J. Chem. Phys.*, **50**, 641-644 (1969).
- R024 Some Comments on the Calculation of NMR Line Shapes for Exchanging AB Spin Systems, C.S. Johnson, Jr., *J. Magn. Reson.*, **1**, 98-104 (1969).
- R025 Electron Spin Resonance in the NN'-Dimethylpyrazine Cation Radical, M.K. Ahn and C.S. Johnson, Jr., *J. Chem. Phys.*, **50**, 632-640, (1969).
- R026 Errors in the Measurement of Electron Transfer Rates by Means of Electron Spin Resonance, C.S. Johnson, Jr. and J.B. Holtz, *J. Chem. Phys.*, **50**, 4420-4424 (1969).
- R027 Intermediate Resolution NMR Spectra of Solids by Means of Magnetic Dilution, H.M. McIntyre, T.B. Cobb, and C.S. Johnson, Jr., *Chem. Phys. Lett.*, **4**, 585-586 (1970).
- R028 The Determination for Rotational Correlation Times for Spin Labels, G. Poggi and C.S. Johnson, Jr., *J. Magn. Reson.*, **3**, 436-445 (1970).
- R029 Magnetic Resonance Line Shapes in Solids: The Rotating Three Spin Group, T.B. Cobb and C.S. Johnson, Jr., *J. Chem. Phys.*, **52**, 6224-6231 (1970). Erratum: *ibid.*, **53**, 4122 (1970).
- R030 Magnetic Resonance Line Shapes in Solids II: Molecular Motion in Methyl Chloroform and Methyl Trichlorosilane, H.M. McIntyre and C.S. Johnson, Jr., *J. Chem. Phys.*, **55**, 345-352 (1971).
- R031 On the Structure of the Activated Complex in Atom Transfer Reactions, A.B. Gooch, R.G. Griffin, C.S. Johnson, Jr., and R.C. Chang, *J. Am. Chem. Soc.*, **93**, 2819-2820 (1971).
- R032 Nuclear Spin Relaxation in Nematic Liquid Crystals, C.L. Watkins and C.S. Johnson, Jr., *J. Phys. Chem.*, **75**, 2452-2458 (1971).
- R033 Numerical Evaluation of Moments and Shapes of Magnetic Resonance Lines for Crystals and Powders, G.W. Canters and C.S. Johnson, Jr., *J. Magn. Reson.*, **6**, 1-14 (1972).
- R034 Observation of Quantum Mechanical Tunneling Effects in the NMR Line Shape for a Methyl Group, C. Mottley, T.B. Cobb, and C.S. Johnson, Jr., *J. Chem. Phys.*, **55**, 5823-25 (1971).

- R035 The Effects of H_1 Inhomogeneity on T_1 Measurements, Anil Kumar and C.S. Johnson, Jr., *J. Magn. Reson.*, **7**, 55-59 (1972).
- R036 Quasi-Elastic Light Scattering from Two Component Mixtures, W.W. Wilson and C.S. Johnson, Jr., *J. Phys. Chem.*, **76**, 2744-2749 (1972).
- R037 The Calculation of NMR Spectra for Many-Site Exchange Problems, C.S. Johnson, Jr. and C.G. Moreland, *J. Chem. Ed.*, **50**, 477-483 (1973).
- R038 NMR Line Shapes for a Tunneling Two Proton System: A Model for the CH_2D Group, C.S. Johnson, Jr., *J. Chem. Phys.*, **59**, 623-627 (1973).
- R039 Quantum Mechanical Tunneling in NMR: Effects of a Potential Barrier Having Sixfold Symmetry on the Spectrum of a Methyl Group, T.B. Cobb and C.S. Johnson, Jr., *J. Chem. Phys.*, **59**, 4478-4485 (1973).
- R040 The Temperature Dependence of Quantum Mechanical Tunneling Effects in the NMR Spectrum of a Methyl Group, C.S. Johnson, Jr. and C. Mottley, *Chem. Phys. Lett.*, **22**, 430-432 (1973).
- R041 Proton Spin-Lattice Relaxation Studies of Reorienting Methyl Groups in Solids, Anil Kumar and C.S. Johnson, Jr., *J. Chem. Phys.*, **60**, 137-146 (1974).
- R042 Pregelation Aggregation of Sickle Cell Hemoglobin, W.W. Wilson, M.R. Luzzana, J.T. Penniston, and C.S. Johnson, Jr., *Proc. Nat. Acad. Sci. USA*, **71**, 1260-1263 (1974).
- R043 Magnetic Resonance Line Shapes in Solids III. Tunneling in Low Temperature Glasses, C. Mottley and C.S. Johnson, Jr., *J. Chem. Phys.*, **61**, 1078-1081 (1974).
- R044 **Book:** Problems and Solutions in Quantum Chemistry and Physics, C.S. Johnson, Jr. and L.G. Pedersen (Addison-Wesley Publ. Co., Reading, Mass., 1974). pp.432.
- R045 Raman Studies of Rotational and Vibrational Relaxation in Liquid Fluoroform, J. DeZwaan, D.W. Hess, and C.S. Johnson, Jr., *J. Chem. Phys.*, **63**, 422-426 (1975).
- R046 The Anomalous Low Temperature Relaxation of Methyl Protons, C.S. Johnson, Jr. and I.Y. Wei, *Chem. Phys. Lett.*, **35**, 236-238 (1975).
- R047 Theory of Two Maxima in the Temperature Dependence of the Spin-Lattice Relaxation Rate of Rotating Three-Spin Systems in Solids, P.S. Hubbard and C.S. Johnson, Jr., *J. Chem. Phys.*, **63**, 4933-4940 (1975).
- R048 From laboratory of CSJ: Syntheses of 2-Chloro-2-methylpropane-1,1,1,3,3,3- d_6 , 2-Chloro-2-methylpropane- d_9 , 2,2-Dimethyl- d_6 -propane-1,1,1- d_3 and 2,2-Dimethylpropane- d_{12} , I.Y. Wei, *J. Labelled Compounds*, **10**, 355 (1974).

- R049 NMR Spectra of Pseudotetrahedral Molecules Dissolved in a Nematic Liquid Crystal Mixture, I.Y. Wei and C.S. Johnson, Jr., *J. Magn. Reson.*, **23**, 259-264 (1976).
- R050 The Effect of Torsional Vibrations on the Minimum Value of T_1 for Methyl Protons in Solids, C.S. Johnson, Jr., *J. Magn. Reson.*, **24**, 63-70 (1976).
- R051 Theory of the Temperature Dependence of the NMR Spectra of Tunneling Methyl Groups, C.S. Johnson, Jr. and C. Mottley, *J. Phys. C., Solid St. Phys.*, **9**, 2789-2795 (1976).
- R052 Photon Correlation Spectroscopy Using a Jet Stream Dye Laser, C.R. Jones and C.S. Johnson, Jr., *J. Chem. Phys.*, **65**, 2020-2021 (1976).
- R053 Proton Spin-Lattice Relaxation in Polycrystalline CH_3SiCl_3 , CH_3GeCl_3 , and CH_3SnCl_3 , I.Y. Wei and C.S. Johnson, Jr., *J. Magn. Reson.*, **28**, 377-381 (1977).
- R054 Photon Correlation Spectroscopy of Hemoglobin: Diffusion of Oxy-HbA and Oxy-HbS, C.R. Jones and C.S. Johnson, Jr., and J.T. Penniston, *Biopolymers*, **17**, 1581-1593 (1978).
- R055 Selective Deuteration and the Anomalous Temperature Dependence of Proton Spin-Lattice Relaxation in Polycrystalline p-tert-butyltoluene, G. Banks, I.Y. Wei, and C.S. Johnson, Jr., *J. Chem. Phys.* **69**, 2882-2891 (1978).
- R056 A Practical Analysis for Coherent Anti-Stokes Raman Scattering (CARS) Spectra, J.W. Fleming and C.S. Johnson, Jr., *J. Raman Spectros.*, **8**, 284-290 (1979).
- R057 Experimental Evidence that Mutual and Tracer Diffusion Coefficients for Hemoglobin Are Not Equal, R.S. Hall and C.S. Johnson, Jr., *J. Chem. Phys.*, **72**, 4251-4253 (1980).
- R058 Photon Correlation Spectroscopy in Strongly Absorbing and Concentrated Samples with Applications to Unliganded Hemoglobin, R.S. Hall, Y.S. Oh, and C.S. Johnson, Jr., *J. Phys. Chem.*, **84**, 756-767 (1980).
- R059 The Complete Determination of Kinetic Rate Constants for Coupled Chemical Reactions by Means of Relaxation Spectroscopy, C.S. Johnson, Jr. and W.O. Romine, Jr., *Chem. Phys. Lett.*, **71**, 145-147 (1980).
- R060 The Wave Vector Dependence of Diffusion Coefficients in Photon Correlation Spectroscopy of Protein Solutions, Y.S. Oh and C.S. Johnson, Jr., *J. Chem. Phys.* **74**, 2717-2720 (1981).
- R061 Laser Light Scattering, C.S. Johnson, Jr. and D.A. Gabriel in *Spectroscopy in Biochemistry*, Vol. II, Ed. J. E. Bell (CRC Press, Inc., Uniscience Series, Boca Raton, 1981), Chapter 5 (177-272) Review Article.

- R062 Elastic Properties of Deoxy-Hemoglobin S (deoxy HbS) Gels, D.A. Gabriel, L.A. Smith, and C.S. Johnson, Jr., *Arch. Biochem. Biophys.* **211**, 774-776 (1981).
- R063 Artifacts in the Measurement of Diffusion Coefficients for Hemoglobin by Means of Intensity Fluctuation Spectroscopy, C.S. Johnson, Jr., *Biophys. J.*, **35**, 803-804 (1981).
- R064 Tracer Diffusion Coefficients of Oxy-HbA and Oxy-HbS in Blood Cells as Determined by Pulsed Field Gradient NMR, C.H. Everhart, D.A. Gabriel, and C.S. Johnson, Jr., *Biophys. Chem.*, **16**, 241-245 (1982).
- R065 The Determination of Tracer Diffusion Coefficients for Proteins by means of Pulsed Field Gradient NMR with Applications to Hemoglobin, C.H. Everhart and C.S. Johnson, Jr., *J. Magn. Reson.*, **48**, 466-474 (1982).
- R066 Pulsed Field Gradient NMR Determination of the Temperature Dependence of the Tracer Diffusion Coefficient of Hemoglobin, C.H. Everhart and C.S. Johnson, Jr., *Biopolymers*, **21**, 2049-2054 (1982).
- R067 Resonance Raman Spectra of Naphthalene and Naphthalene-d₈ Anions in THF, S.D. Christesen and C.S. Johnson, Jr., *J. Raman Spectros.*, **14**, 53-58 (1983).
- R068 Efficiency of Resonance Enhanced Rayleigh Scattering in Dilute Solutions and Its Relation to Diffraction by Volume Holograms, C.S. Johnson, Jr., *J. Opt. Soc. Am.*, **73**, 1263-1267 (1983).
- R069 Holographic Relaxation Spectroscopy of Benzospiropyran in Mixtures of Water and Dioxane, D.M. Miles, Jr., P.D. Lamb, K.W. Rhee, and C.S. Johnson, Jr., *J. Phys. Chem.*, **87**, 4815-4822 (1983).
- R070 Computer Algebra, C.S. Johnson, Jr., *J. Chem. Info. Comp. Sci.*, **23**, 151-157 (1983)
- R071 Diffraction from Multiple Gratings in Holographic Relaxation Spectroscopy: Application to Bovine Serum Albumin Labeled with Benzospiropyran, K.W. Rhee, D.A. Gabriel, and C.S. Johnson, Jr., *J. Phys. Chem.*, **88**, 4010-4015 (1984).
- R072 Electrophoresis Combined with Holographic Relaxation Spectroscopy: A New Method for Determining Mobilities in Mixtures, K.W. Rhee, J. Shibata, A. Barish, D.A. Gabriel, and C.S. Johnson, Jr., *J. Phys. Chem.*, **88**, 3944-3946 (1984).
- R073 Chemical Exchange Effects in Holographic Relaxation Spectroscopy, C.S. Johnson, Jr., *J. Chem. Phys.*, **81**, 5384-5388 (1984).
- R074 Structural and Dynamic Origins of Intensity in Holographic Relaxation Spectroscopy, C.S. Johnson, Jr., *J. Opt. Soc. Am., Part B*, **2**, 317-321 (1985).
- R075 Tracer Diffusion Coefficients of Proteins by Means of Holographic Relaxation Spectroscopy: Application to Bovine Serum Albumin, U. Arunyawongskorn, C.S. Johnson, Jr., and D.A. Gabriel, *Anal. Biochem.*, **146**, 265-270 (1985).

- R076 Theory of Holographic Relaxation Spectroscopy with Nonsinusoidal Gratings, J. H. Shibata and C.S. Johnson, Jr., *Appl. Spectros.*, **39**, 786-793 (1985).
- R077 Evidence of Chemical Exchange Effects in Holographic Relaxation Spectroscopy: The Binding of Benzospiropyran to Bovine Serum Albumin, K.W. Rhee, D.A. Gabriel, and C.S. Johnson, Jr., *J. Phys. Chem.*, **89**, 3193-3195 (1985).
- R078 Holographic Relaxation Spectroscopy of Human IgG: Laser Induced Aggregation, U. A. Stewart, C.S. Johnson, Jr., and D.A. Gabriel, *Macromolecules*, **19**, 964-968 (1986).
- R079 A Holographic Relaxation Spectrometer Based on Pattern Imaging, A. Barish, M.S. Bradley, and C.S. Johnson, Jr., *Rev. Sci. Instr.*, **57**, 904-909 (1986).
- R080 Diffusion of Photochromic Molecules: Comparison of Pulsed Field Gradient NMR and Holographic Relaxation Spectroscopy, L.S. Lever, M.S. Bradley, and C.S. Johnson, Jr., *J. Magn. Reson.*, **68**, 335-344 (1986).
- R081 Photoinduced Ionization of Bovine Serum Albumin by Holographic Relaxation Methods, A. Barish and C.S. Johnson, Jr., *J. Chem. Phys.*, **85**, 4194-4195 (1986).
- R082 **RE-RELEASE:** Problems and Solutions in Quantum Chemistry and Physics, C.S. Johnson, Jr. and L.G. Pedersen (Dover Publications, Inc., New York, 1986). pp. 429. (Corrected and slightly revised version of ref.44 reprinted by Dover)
- R083 The Effects of Tunneling on NMR Spectra. The Question of Heavy Atom tunneling in Norbornyl Cation Rearrangements, M. Saunders and C.S. Johnson, Jr., *J. Am. Chem. Soc.*, **109**, 4401-4402 (1987).
- R084 Dynamics in BSA solutions at Low Ionic Strengths as Observed by Holographic Relaxation Spectroscopy, A. Barish, D.A. Gabriel, and C.S. Johnson, Jr., *J. Chem. Phys.*, **87**, 3594-3602 (1987).
- R085 Tunneling Effects in the NMR Spectrum of a Spin in a Symmetrical Double-Well Potential, C.S. Johnson, Jr., *J. Magn. Resonance*, **73**, 545-547 (1987).
- R086 Coupled Diffusive Modes in BSA Solutions at Low Ionic Strengths, C.S. Johnson, Jr., A.O. Barish, and D.A. Gabriel, in Ordering and Organisation in Ionic Solutions (Yamada Conference XIX), eds. N. Isi and I. Sogami, (World Scientific Pub., Co., Singapore, 1988) pp. 176-185.
- R087 Transport of Probe Molecules Through Fibrin Gels as Observed by Means of Holographic Relaxation Methods, U.A. Stewart, M.S. Bradley, C.S. Johnson, Jr., and D.A. Gabriel, *Biopolymers*, **27**, 173-185 (1988).

- R088 Imaging of Transient Magnetization Gratings in NMR: Analogies with Laser Induced Gratings and Applications to Diffusion and Flow, T.R. Saarinen and C.S. Johnson, Jr., *J. Magn. Reson.*, **78**, 257-270 (1988).
- R089 High-Resolution Electrophoretic NMR, T.R. Saarinen and C.S. Johnson, Jr., *J. Am. Chem. Soc.*, **110**, 3332-3333 (1988).
- R090 **From laboratory of CSJ**: Computer-Controlled Pulsed Magnetic Field Gradient NMR System for Electrophoretic mobility Measurements, T.R. Saarinen and W.S. Woodward, *Rev. Sci. Instr.*, **59**, 761-763 (1988).
- R091 Probes of Fibrin Gel Porosity, I.H. Park, C.S. Johnson, Jr., M.R. Jones, and D.A. Gabriel, in Fibrinogen 3: Biochemistry, Biological Functions, Gene Regulation and Expression, eds. M.W. Mosesson, et al., (Elsevier Science Publishers, 1988) pp. 123-126.
- R092 Paraprotein Modified Fibrin Gels, M. Jones, J. McDonagh, C.S. Johnson, Jr., M.R. Jones, and D.A. Gabriel, in Fibrinogen 3: Biochemistry, Biological Functions, Gene Regulation and Expression, eds. M.W. Mosesson, et al., (Elsevier Science Publishers, 1988) pp. 117-121.
- R093 Two-Dimensional Electrophoretic NMR for the Measurement of Mobilities and Diffusion in Mixtures, Q. He and C. S. Johnson, Jr., *J. Magn. Reson.*, **81**, 435-439 (1989).
- R094 Electrophoretic NMR, C.S. Johnson, Jr. and Q. He, Adv. Magn. Resonance, Vol. **13**, Ed. W.W. Warren (Academic Press, Inc., New York, 1989) pp. 131-159.
- R095 Holographic Relaxation Studies of Probe Diffusion in Polyacrylamide Gels: Search for a Universal Equation, I.H. Park, D.A. Gabriel, and C.S. Johnson, Jr., *Macromolecules*, **23**, 1548-1553 (1990).
- R096 Radiation Pressure Induced Gratings in Suspensions of Colloidal Particles: Dynamics of Formation and Decay, K. Xia, I.H. Park and C. S. Johnson, Jr., *J. Chem. Phys.*, **91**, 1351-1356 (1989).
- R097 Stimulated Echo Electrophoretic NMR, Q. He and C.S. Johnson, Jr., *J. Magn. Reson.*, **85**, 181-185 (1989).
- R098 A Holographic Relaxation Spectrometer with Phase Modulated Detection, R.M. Odear, I.H. Park, K. Xia, and C.S. Johnson, Jr., *Rev. Sci. Instr.*, **62**, 27-32 (1991).
- R099 Measurement of Mobility Distributions for Vesicles by Electrophoretic NMR, Q. He, D.P. Hinton, C.S. Johnson, Jr., *J. Magn. Reson.* **91**, 654-658 (1991).
- R100 A PFG-NMR Experiment for Accurate Diffusion and Flow Studies in the Presence of Eddy Currents, S.J. Gibbs and C.S. Johnson, Jr., *J. Magn. Reson.*, **93**, 395-402 (1991).

- R101 Design and Implementation of a Shielded Gradient Coil for PFG NMR Diffusion and Flow Studies, S.J. Gibbs, K. Morris, and C.S. Johnson, Jr., *J. Magn. Reson.*, **94**, 165-169 (1991).
- R102 A Pulsed Field Gradient NMR Study of Probe Motion in Polyacrylamide Gels, S.J. Gibbs and C.S. Johnson, Jr., *Macromolecules*, **24**, 6110-6113 (1991).
- R103 Polyammonium Cation Diffusion in Aqueous Solutions of DNA as Studied by Pulsed Field Gradient NMR, S.J. Gibbs and C.S. Johnson, Jr., *Macromolecules*, **24**, 5224-5225 (1991).
- R104 Mobility Ordered 2D-NMR Spectroscopy, K.F. Morris and C.S. Johnson, Jr., *J. Am. Chem. Soc.* **114**, 776-777 (1992).
- R105 Diffusion Ordered 2D-NMR Spectroscopy, K.F. Morris and C.S. Johnson, Jr., *J. Am. Chem. Soc.* **114**, 3139-3141 (1992).
- R106 Mobility Ordered 2D-NMR Spectroscopy for the Analysis of Ionic Mixtures, K.F. Morris and C.S. Johnson, Jr., *J. Magn. Reson.* **A101**, 67-73 (1993). [Note: volume number error on reprint]
- R107 Effects of Chemical Exchange in Diffusion Ordered NMR Spectra, C.S. Johnson, Jr., *J. Magn. Reson.* **A102**, 214-218 (1993).
- R108 The Resolution of Discrete and Continuous Molecular Size Distributions by Means of Diffusion Ordered 2D-NMR Spectroscopy, K.F. Morris and C.S. Johnson, Jr., *J. Am. Chem. Soc.* **115**, 4291-4299 (1993).
- R109 Transport Ordered 2D-NMR Spectroscopy, C.S. Johnson, Jr., in "Magnetic Resonance Probes of Molecular Dynamics," ed. R. Tycko, (Kluwer Academic Publ., Dordrecht, 1994) chap. 10, 455-488.
- R110 Cascade Polymers. pH Dependence of Hydrodynamic Radii of Acid Terminated Dendrimers, G.R. Newkome, J.K. Young, G.B. Baker, R.L. Potter, L. Audoly, D. Cooper, C.D. Weis, K.F. Morris, and C.S. Johnson, Jr., *Macromolecules* **26**, 2394-2396 (1993).
- R111 **From the laboratory of CSJ:** A Computer Driven Bipolar Magnetic Field Gradient Driver for NMR Electrophoretic and Self-Diffusion Measurements, R.M. Boerner and W.S. Woodward, *J. Magn. Reson.* **106**, 195-202 (1994).
- R112 Diffusion Ordered 2D-NMR Spectroscopy of Phospholipid Vesicles: Determination of Vesicle Size Distributions, D.P. Hinton and C.S. Johnson, Jr., *J. Phys. Chem.* **97**, 9064-9072 (1993).
- R113 A Sample Spinner for Vibration Sensitive Liquid State Experiments with Application to Diffusion Ordered 2D NMR, D. Wu, W.S. Woodward and C.S. Johnson, Jr., *J. Magn. Reson.* **A104**, 231-233 (1993).

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- R115 "Smart" Cascade Polymers.¹ Modular Synthesis of Four-Directional Dendritic Macromolecules with Acid, Neutral, or Basic Terminal Groups and the Effect of pH Changes on the Hydrodynamic Radii, J.K. Young, G.R. Baker, G.R. Newkome, K.F. Morris, and C.S. Johnson, Jr., *Macromolecules* **27**, 3464-3471 (1994).
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