

SUMMARY RESUMÉ

Raymond N. Rogers was born 21 July 1927 in Albuquerque, NM. He was group leader of an explosives research-and-development group at the University of California, Los Alamos National Laboratory, was elected Laboratory Fellow in 1981, and retired in 1988. He was appointed Director of Chemical Research for the Shroud of Turin Research Project in 1978, applying thermal methods to the study of the relic. He served on the Department of the Air Force Scientific Advisory Board from 1987 until 1992 with the equivalent rank of Lt. General.

Major research interests were explosives safety, super-energy explosives, low-intensity conflict (non-violent war), energy resources, applications of chemical methods (primarily thermal) to the study of archaeological samples, and application of chemical science to intelligence operations. A short summary of his work on explosives safety can be found at the following web site: <http://home.att.net/~rnrogers>.

He has published popular articles on dogs and firearms as well as papers on chemistry, archaeology/anthropology, soil science, and energy. He has served as an expert witness on several legal actions.

RESUMÉ RAYMOND N. ROGERS

Born: 21 July 1927, Albuquerque, NM.

Laboratory Fellow (Ret.), University of California, Los Alamos National Laboratory, 1981-2005

Past Positions:

- Retired Fellow, research on super-energy explosives, low-intensity conflict, and explosives safety (1988 - present).
- Fellow, Top Secret, QN, CIA, SI/TK/Gamma, and CSI research on intelligence problems (1985 - 1988).
- Fellow, Top Secret and CSI research on conventional weapons, unconventional weapons, low intensity conflict, fuel-air explosives (FAE), fuel-water explosives (FWE), super-energy explosives, shaped charges (1982 - 1985).
- Fellow, basic research on explosives, explosives safety, and synthetic fuels (1980 - 1982).
- Group Leader, Los Alamos National Laboratory, Explosives research and Development. Personal research on explosives safety and synthetic fuels (6/74 - 10/80). QN, TS, and CIA clearances.
- Chairman, Los Alamos National Laboratory, Explosives Development Committee (1974-1988). Helped write DoE Explosives Safety Manual.
- Sabbatical. Research on chemistry of deposits and artifacts of interest in archaeology and geochronology, University of Arizona (1967 - 1968).
- Alternate Group Leader, Los Alamos National Laboratory, Explosives R&D (5/66 - 6/74). QN clearance.

- Section Leader, Los Alamos National Laboratory, Explosives R&D, Analysis and Stability. Personal research on chemical analysis and explosives safety (5/61 - 5/66).
- Staff Member, Los Alamos Scientific Laboratory (4/52 - 5/61). Q and Secret NSI clearances.
- Research Chemist (water and industrial waste treatment), Infilco Inc., Tucson, AZ (1950 - 1952).
- Research Fellow, Arizona State Agricultural Experiment Station, Tucson, AZ (1948 - 1950).

Education:

University of Arizona, Tucson, AZ
 MS, 1950, Chemistry
 BS, 1948, Chemistry

Honors:

- Editor, Thermochemica Acta, 1970 to 1988.
- American Chemical Society, Tour Speaker, 1971.
- Los Alamos National Laboratory, Fellow, 1981 to present.
- Editor, J. Energetic Materials, 1983-1988.
- Los Alamos National Laboratory, Distinguished Performance Award, 1984.
- Department of the Air Force, appointment to Scientific Advisory Board, 1987.
- Department of the Air Force, Exceptional Civilian Service Medal, 1991.
- Appointed Director of Chemical Research on the international Shroud of Turin Research Project, 1977.
- ΦΛΥ, academic honorary fraternity for chemistry.
- ΣΠΣ, academic honorary fraternity for physics.
- ΦΚΦ, academic honorary fraternity for universities.

Interests:

- Explosives Chemistry
- Thermochemistry/Physical Chemistry
- Explosives safety
- Archaeology (Anthropology): Dating methods and organic analysis.
- Soil Science
- Waste disposal
- Chemistry of Fossil Fuels
- Training search-and-rescue dogs
- Radio communications (amateur license KC5BRL)

BIBLIOGRAPHY

Chemistry:

This bibliography does not include any classified documents or patents.

- 1) Rogers, R. N., Yasuda, S. K., "Rapid Microdetermination of Fluorine in Organic Compounds," Anal. Chem. 31, 616 (1959).

- 2) Rogers, R. N., "A Simple Determination of Uranium in Graphite," *Anal. Chem.* 31, 2071 (1959).
- 3) Rogers, R. N., "Determination of Phosphorus in High Explosives," *Anal. Chem.* 32, 1050 (1960).
- 4) Yasuda, S. K., Rogers, R. N., "Separation and Microdetermination of Hexahydro-1,3,5-trinitro-s-triazine in Octahydro-1,3,5,7-tetranitro-s-tetrazine," *Anal. Chem.* 32, 910 (1960).
- 5) Yasuda, S. K., Rogers, R. N., "Microdetermination of Boron in Organic Boron Compounds," *Microchem. J.* 4, 155 (1960).
- 6) Rogers, R. N., "The Simple Microscale Differential Thermal Analysis of Explosives," *Microchem. J.* 5, 91 (1961).
- 7) Rogers, R. N., Yasuda, S. K., Zinn, J., "Pyrolysis as an Analytical Tool," *Anal. Chem.* 32, 672 (1960).
- 8) Zinn, J., Rogers, R. N., "Thermal Initiation of Explosives," *J. Phys. Chem.* 66, 2646 (1962).
- 9) Rogers, R. N., "Incompatibility in Explosive Mixtures," *Ind. Eng. Chem. Product Research and Development* 1, 169 (1962).
- 10) Rogers, R. N., Thermal Properties of Explosives and Related Compounds, GMX-2-R-61-1, Los Alamos Scientific Laboratory (1961).
- 11) Rogers, R. N., "Determination of Boric Acid in Admixture with Cyanuric Acid," LA-3193, TID-4500, Los Alamos Scientific Laboratory (1965).
- 12) George, R. S., Cady, H. H., Rogers, R. N., and Rohwer, R. K., "Solvates of Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine," *Ind. and Eng. Chem. Product Research and Development* 4, 209 (1965).
- 13) Rogers, R. N., Morris, E. D., "Determination of Emissivities with a Differential Scanning Calorimeter," *Anal. Chem.* 38, 410(1966).
- 14) Rogers, R. N., Morris, E. D., "Estimation of Activation Energies with a Differential Scanning Calorimeter," *Anal. Chem.* 38, 412 (1966).
- 15) Rogers, R. N., "Combined Pyrolysis and Thin Layer Chromatography," *Anal. Chem.* 39, 730 (1967).
- 16) Rogers, R. N., Smith, L. C., "Estimation of Preexponential Factor from Thermal Decomposition Curve of an Unweighed Sample," *Anal. Chem.* 39, 1024 (1967).
- 17) Rogers, R. N., "Thermal Studies of the Physical Chemistry of Explosives," Symposium on Thermochemical Methods, Wilmington, DE, (invited paper, 1967).
- 18) Rogers, R. N., Smith, L. C., "Application of Scanning Calorimetry to the Study of Chemical Kinetics," *Thermochimica Acta* 1, 1 (1970).
- 19) Rogers, R. N., Smith, L. C., "Application of Combined Pyrolysis - TLC to the Study of Chemical Kinetics," *J. Chromatog.* 48, 268 (1970).
- 20) Rogers, R. N., Dinegar, R. H., "Thermal Analysis of Crystal Habits of Pentaerythritol Tetranitrate," *Thermochimica Acta* 3, 367 (1972).
- 21) Rogers, R. N., "A Comparison of Thermochemical Methods for the Determination of Kinetics Constants," Proceedings of ICT Symposium on Lifetime of Explosives and Propellants, Karlsruhe, Germany (1971).
- 22) Rogers, R. N., Ortiz, L. W., "Thermal Characterization of the Plastic Crystalline Phase," *Thermochimica Acta* 3, 379 (1972).
- 23) Ortiz, L. W., Rogers, R. N., "Simplification of Differential Temperature Calibration and Emittance Measurements in Scanning Calorimetry," *Thermochimica Acta* 3, 383 (1972).

- 24) Rogers, R. N., "Simplified Determination of Rate Constants by Scanning Calorimetry," *Anal. Chem.* **44**, 1336 (1972).
- 25) Rogers, R. N., "Differential Scanning Calorimetric Determination of Kinetics Constants of Systems that Melt with Decomposition," *Thermochemica Acta* **3**, 437 (1972).
- 26) Rogers, R. N., Daub, G. W., "Scanning Calorimetric Determination of Vapor-Phase Kinetics Data," *Anal. Chem.* **45**, 596 (1973).
- 27) Rogers, R. N., "Determination of Condensed-Phase Kinetics Constants," *Thermochemica Acta* **9**, 855 (1974).
- 28) Rogers, R. N., "Thermochemistry of Explosives," *Thermochemica Acta* **11**, 222 (1975).
- 29) Rogers, R. N., "Compatibility and Chemical Kinetics," Proceedings of Conference on Compatibility of Propellants, Explosives, and Pyrotechnics with Plastics and Additives, Picatinny Arsenal, Dover, NJ, December 3-4 (1974), published by the American Defense Preparedness Association.
- 30) Cady, H. H., Coburn, M. D., Harris, B. W., Rogers, R. N., "Synthesis and Thermochemistry of Ammonium 2,4,5-Trinitroimidazole," LA-6802-MS, July 1977.
- 31) Loughran, E. D., Wewerka, E. M., Rogers, R. N., Berlin, J. K., "The Influence of Metals on the Thermal Decomposition of s-Triaminotrinitrobenzene (TATB)," LA-6873-MS, July 1977.
- 32) Rogers, R. N., "Explosives Compatibility Evaluation with a Differential-Scanning Calorimeter," Proceedings of ICT Symposium on Explosives and Propellants, Karlsruhe, Germany (1980).
- 33) Rogers, R. N., Janney, J. L., "The Thermal Decomposition Kinetics of 1,3,5-Triamino-2,4,6-trinitrobenzene," Proceedings of ICT Symposium on Explosives and Propellants, Karlsruhe, Germany, 1980.
- 34) Rogers, R. N., "Thermal Hazards of Explosives," Los Alamos National Laboratory Minireview, LAL-81-9, March 1981.
- 35) Rogers, R. N., Janney, J. L., "Analysis of Condensed-Phase Reactions by Direct Observation of Energy," Proceedings of the 1981 North American Thermal Analysis Society Conference, New Orleans, LA, October 18-21, 1981, Edited by John P. Schelz, Johnson and Johnson Products, Inc., New Brunswick, NJ, p. 643.
- 36) Janney, J. L., Rogers, R. N., "Experimental Thermochemical Observations of Condensed-Phase Reactions," *Ibid* p. 651.
- 37) Janney, J. L., Rogers, R. N., "Thermochemistry of Mixed Explosives," Proceedings of the Seventh International Conference on Thermal Analysis, Kingston, Ontario, 21-28 August 1982, Vol. II p. 1426, John Wiley & Sons, 1982.
- 38) Rogers, R. N., Janney, J. L., "Thermochemical Evaluation of Zero-Order Processes Involving Explosives," *Ibid* p. 1434.
- 39) Rogers, R. N., Janney, J. L., Ebinger, M. H., "Kinetic-Isotope Effects in Thermal Explosions," *Thermochemica Acta* **59**, 287 (1982).
- 40) Janney, J. L., Rogers, R. N., "Absolute Rate Evaluation of Complex Processes," Proceedings of the 12th North American Thermal Analysis Society Conference, September 1983, edited by Jean C. Buck, p. 469.
- 41) Caldwell, D. J., Edwards, J. B., Keifer, J. R. (all Hercules), Rogers, R. N. (LANL), "Use of Gasimetric, Time-To-Explosion and Isothermal Differential Scanning Calorimetry to Assess Compatibility of Double-Base Propellants and Epoxy Resin System," American Defense Preparedness Association, Symposium on Compatibility of Plastics and Other Materials with Explosives, Propellants, and Pyrotechnics, Lake Ozark, MO, 31 October-2 November 1983.

- 42) Rogers, R. N., Janney, J. L., "The Thermal Decomposition of HMX: Kinetic-Isotope Effect Observations," *Ibid*, p. 474.
- 43) Rogers, R. N., Janney, J. L., Loverro, N. P. (AFATL/DLDE), "Thermal Stability and Compatibility Predictions for the Explosive EAK," *J Energetic Materials* 2, 293 (1984).
- 44) Shackelford, S. A., Coolidge, M. B., Goshgarian, B. B., Loving, B. A., Rogers, R. N., Janney, J. L., and Ebinger, M. H., "Deuterium Isotope Effects in Condensed-Phase Thermochemical Decomposition Reactions of Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine," *J. Phys. Chem.* 1985, 89,3118.
- 45) Shackelford, S. A., Goshgarian, B. B., Chapman, R. D.(all AFSC), Askins, R. E., Flanigan, D. A. (both Morton Thiokol), Rogers, R. N. (LANL), "Deuterium Isotope Effects During HMX Combustion: Chemical Kinetic Burn Rate Control Mechanism Verified," *Propellants, Explosives, Pyrotechnics*, 1989.

Soils:

- 46) Fuller, W., Rogers, R. N., "Utilization of Phosphorus from Barley Residues," *Soil Sci.* 74, 373 (1952).
- 47) Fuller, W., Rogers, R. N., "Utilization of Phosphorus from Barley Residues," *Arizona Ag. Expt. Sta. Tech. Bul. No. 123* (1951).
- 48) Fuller, W., Rogers, R. N., "Utilization of Phosphorus of Algal Cells," *Soil Sci.* 74, 417 (1952).
- 49) Fuller, W., Rogers, R. N., "Utilization of Phosphorus from Soil Algae," *Progressive Ag.* 9, October 1951.

Archaeology and Shroud of Turin:

- 50) Rogers, R. N., "The Determination of Fluorine in Archaeological Samples," *The Midland Discovery*, 1955, University of Texas Press.
- 51) Rogers, R. N., Peek, H. M., Miller, H., "Los Alamos Pollen Cycles," *The Monitor* 6, No. 6, 1 (1966).
- 52) Rogers, R. N., "The Chemistry of Pottery Smudging," *Pottery Southwest* 7, No. 2, 2 (1980).
- 53) Schwalbe, L. A., Rogers, R. N., "Physics and Chemistry of the Shroud of Turin: Summary of the 1978 Investigation," *Analytica Chimica Acta* 135, 3 (1982).
- 54) Rogers R. N., Arnoldi A., "The Shroud of Turin: an amino-carbonyl reaction (Maillard reaction) may explain the image formation," in *Melanoidins vol. 4*, Ames J.M. ed., Office for Official Publications of the European Communities, Luxembourg, 2003, pp. 106-113.
- 55) Rogers, R. N., "Studies on the radiocarbon sample from the Shroud of Turin," *Thermochemica Acta* 425/1-2, 189-194 (2005).
- 56) R. N. Rogers, "Chemical Considerations Concerning The Shroud of Turin," in Kenneth Stevenson (Ed.), *1977 United States Conference of Research on The Shroud of Turin*, 23-24 March 1977, Albuquerque, NM, USA, Holy Shroud Guild, 294 East 150 St., Bronx, N. Y. 10451 (pp. 131-135).

Also contributions to site reports of many archaeological expeditions, for example, site P50-14, Arizona; Casas Grandes, Mexico; Murray Springs, Arizona; and pottery classification by x-ray fluorescence for The Hohokam, Emil Haury.

Energy:

54) Hues, A. D., Rofer, C. K., Rogers, R. N., "Processing of Oil Shale in Molten Hydroxides," American Chemical Society Division of Petroleum Chemistry, St. Louis, MO, April 8-13, 1984.

Popular Articles:

- "Travels with Fido," Backpacker 22, 1978.
- "Ablation and the Bullet," Guns and Ammo, 1979.
- "Putting it on the Dog," DogWorld, January 1993.