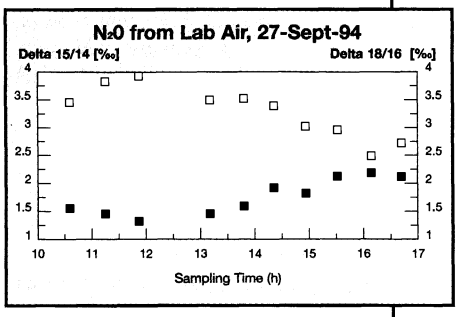
Opinion

Interest in atmospheric trace gases has been increasing since they were recognized as key factors in global warming and depletion of the ozone layer. N_2O and CH_4 are contributing factors to both phenomena. They are greenhouse gases. For instance, the share of N_2O by volume in tropospheric air is increasing by about 0.3 % per year. It also accounts for the major channel of catalytic destruction of O_3.

The precise measurement of ^{15}N abundance in N_2O is an important tool for the identification of atmospheric N_2O sources. However, delicate sample preparation is required. CO_2 - which is present in thousandfold higher concentrations - must be removed to prevent interference with NO_2 at masses 44 and 45.



Whereas 15-300 l of air has previously been required for one measurement, using a Finnigan MAT 252 mass spectrometer it is now possible to measure the $^{15}N/^{14}N$ isotope ratio of N_2O with only 20-100 ml of atmospheric air. Isotope data is acquired after preconcentration and GC separation using a technique developed for GC Combustion Isotope Ratio Monitoring (continuous flow).

Despite the presence of CO_2 and the additional complication of ^{17}O in both CO_2 and N_2O, excellent results are achieved. $\delta^{15/14}N$ and $\delta^{18/16}O$ values can be determined with a reproducibility of 0.3 ‰ and 1.5 ‰ respectively. There is no need for large volume sampling. This may be a valuable aid in future investigations of global warming and ozone depletion. A similar method using the same device is also available for atmospheric methane.

Full details of the experimental setup, procedure and results are given in Finnigan MAT Application News for the MAT 252.

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The OPINION column features technical tips & preliminary information relating to instruments designed & built at Finnigan MAT GmbH, Bremen, Germany.

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tric) processes are presented and interpreted in terms of the various point defect mechanisms. Though this treatment is clear and rigorous, the microscopic theories for the formation and migration energies of point defects are omitted. Many of the primary references (especially experimental ones) are not included, but may be found in the well-selected reviews cited by the authors. Within the aforementioned limitations this treatise is authoritative and should prove very valuable to scientists and advanced students in all the areas of materials science.

—David Turnbull,
Harvard University

Introduction to High-Temperature Superconductivity. THOMAS P. SHEAHEN. Plenum, New York, 1994. xviii, 580 pp., illus. $59.50. Selected Topics in Superconductivity.

The Electric Power Research Institute, as part of its program to develop high-temperature superconductivity applications for the power industry, has in recent years made an endeavor to "educate utility engineers and executives" regarding the subject. One part of this endeavor was the distribution of a series of "tutorials" prepared by the Argonne National Laboratory. The popularity of the tutorials has led to the publication of this book based on them. The book begins at an introductory level by posing and answering the question What is a superconductor? In this opening section are taken up "the magnetic side" of superconductivity, issues involved in obtaining the requisite low temperatures, present applications (both those in which superconductors substitute for conventional magnets and those in which their unique properties are utilized, such as nuclear magnetic resonance imaging), basic theoretical concepts of superconductivity, and the circumstances surrounding the discovery in 1986 of superconductors with unexpectedly higher transition temperatures. Part 2 of the book is an exposition of the basic properties of these new materials—structure, phase equilibria, effects of doping, and so on—with consideration of theoretical issues posed by their discovery. In the remainder of the book (in where Sheahen is joined by various coauthors) potential practical uses of high-temperature superconductors are considered. One section is devoted to how superconductivity differs from conventional models of current flow and the implications of the differences for the production of powders and wire, protection against damage, and AC loss, one to such "near-term" applications as transmission lines, magnetic levitation, magnetic energy storage, and electric motors, and one to more distant possibilities, including among others new refrigerators and the use of high magnetic fields for industrial process control and aerospace cargo launches. Two appendixes on measurement, a brief glossary, and an index conclude the book.

—Katherine Livingston

Crystal Structure Analysis for Chemists and Biologists. JENNY P. GLUSKER with Mitchell Lewis and Miriam Rossi. VCH, New York, 1994. xviii, 854 pp., illus. $69.95. Methods in Stereochemical Analysis.

"Those chemists and biochemists who may never themselves do X-ray diffraction analyses of crystals, but who need to be able to understand the results of such studies on structures of immediate interest to them" are the intended audience for this book. In its introductory chapters are addressed such basic topics as why it is necessary to resort to indirect methods to "see" atoms and molecules, general principles of crystal structure and light diffraction, and concepts of symmetry. In subsequent chapters the author expounds Fourier methods, structure amplitudes, phase angles, electron-density maps, least-squares refinement, interpretation of atomic coordinates, conformation, atomic and molecular displacements, chirality, and packing, ending the work with discussions of comparison among crystal structures, intermolecular recognition, and stereochemical study of reactions. Particularly in the early chapters, historical information is interspersed with the more technical exposition, and each chapter concludes with a summary enumerating its key points, a glossary of terms introduced, and a list of (on average) about 100 references. The volume concludes with a two-page checklist-style outline of "strategies for determining crystal structures," an index to the glossaries, and a general subject index.

—Katherine Livingston

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Books Received

Alternatives to Animal Testing. Christoph A. Reinhardt, Ed. VCH, New York, 1994. xviii, 182 pp., illus. Paper, $90. Based on a symposium, Zurich, Nov. 1992.

The Baby Train. And Other Lusty Urban Legends. Jan Harold Brunvand. Norton, New York, 1994. 367 pp., illus. Paper, $9.98. Reprint, 1993 ed.

Challenging Racism and Sexism. Alternatives to Genetic Explanations. Ethel Tobach and Betty Rosoff, Eds. Feminist Press at the City University of New York, New York, NY, 1994. x, 337 pp. $35; paper, $14.95. Genes and Gender, 7. Based on a symposium, 1990.

Deterministic Chaos in General Relativity. David Hobill, Adrian Burd, and Alan Coley, Eds. Plenum, New York, 1994. xii, 472 pp., illus. $135. NATO ASI Series B, vol. 332. From a workshop, Kananaskis, AB, July 1993.

Enabling Technologies for Cultured Neural Net-