

News Briefs

General Developments

CME INITIATES ROUND ROBIN ON ULTRASONIC REFERENCE BLOCKS

The Center for Manufacturing Engineering (CME) organized and initiated a round robin on the measurement of aluminum ultrasonic reference blocks as part of an effort to develop an annex to an ASTM standard (E-127). As requested by ASTM, NIST, as the lead laboratory, is supplying reference blocks and calibration data for this activity. If the results of the round robin are successful, laboratories will be able to certify ultrasonic reference blocks by a block-to-block comparison method using more readily available ultrasonic instrumentation and reference blocks measured by NIST.

FIRST ELEMENTS OF ADVANCED MEASUREMENT FACILITY ARRIVE IN CME

The first components of a new Molecular Measuring Machine Facility under long-term development have been installed in CME's metrology laboratory. Arrival of the components marks the midpoint of a major program in CME to develop the world's most advanced long-scan atomic-resolution dimensional measuring machine. Housed in a new lab-control room suite, the components consist of a custom-chambered vacuum system and a parallel-processor computer system for data acquisition, environmental monitoring, and positional control. The new facility, dubbed M-Cubed, is being designed to provide the capability to repeatably locate and measure positions of individual features of atomic dimension to accuracies of 0.1 nm anywhere within a 50×50 mm area. Requiring advances in the state of the art of each of its subsystems (e.g., interferometry to one eight-

thousandth of a wavelength and characterization of the wear of slideways to resolutions of 0.01 nm per meter of travel), the machine at the heart of the facility is scheduled for initial assembly in December 1989 and full operation in summer 1991.

NONDESTRUCTIVE EVALUATION SENSORS FOR PROCESSING OF HIGH- T_c SUPERCONDUCTORS

Research in the Metallurgy Division has demonstrated the feasibility of using nondestructive evaluation (NDE) sensors to monitor microstructural characteristics of high- T_c superconductors during high-temperature processing. The research was applied to the $Y_1Ba_2Cu_3O_{7-x}$ system. Both ultrasonic velocity and eddy current conductivity measurements were made on the material during simulated processing at high temperatures. Phase changes in the oxide and changes in oxygen concentration were readily detected and monitored in real time.

The ability to monitor the quality of high- T_c superconductors during manufacturing will enhance U.S. industry's ability to produce these technologically important materials.

NIST WORKSHOP ON CALIBRATION OF STRONTIUM-90 OPHTHALMIC APPLICATORS

Strontium-90 ophthalmic applicators are radioactive sources used in the treatment of pterygium, an eye condition that can be corrected with shallow-dose exposures of beta particles. The Ionizing Radiation Division of NIST sponsored a workshop to bring together the small community that is focussing on this measurement problem. This community consists of the industrial source manufacturer, university and hospital research laboratories, and the Nuclear Regulatory Commission.

In the United States the condition has been mainly found in people of Hispanic descent, although it afflicts people in tropical regions around the world. Surgical removal of the diseased tissue followed by treatment of the residual cells with intense beta radiation is a remarkably effective treatment. As a result of this workshop, several laboratories will use different detectors and measurement techniques to evaluate discrepancies in surface absorbed dose rate that have been found in the calibration of ophthalmic applicators. The discrepancies seem to be explainable by differences in the size of the collection electrodes of the extrapolation chambers used to measure the beta-particle radiation.

NIST ESTABLISHES NEW DATA SERVICE

NIST has established a new data service that supports the development of advanced methods of elemental and isotopic analysis by providing formatted data and application sheets to permit the routine use of RIS/RIMS in analytical chemistry. The data service relates to the analytical techniques of Resonance Ionization Spectroscopy (RIS) and Resonance Ionization Spectroscopy followed by Mass Spectrometry (RIMS). These still emerging techniques, applicable in principle to nearly all atoms, have the potential of providing unsurpassed sensitivity (single atom) and selectivity (both specific atomic number and atomic weight). They are well suited to important problems in non-destructive testing, monitoring environmental pollutants, performing trace impurity analysis, and inspecting radioactive contamination as well as many other areas.

A format for RIS/RIMS data sheets has been designed in consultation with the RIS community. Data sheets for an initial group of 10 elements (As, B, Cd, C, Ge, Au, Fe, Pb, Si, and Zn) have been prepared. These sheets list the element, its stable isotopes, isotope shifts and hyperfine structure, RIS schemes, atomic energy levels, lifetimes, oscillator strengths, laser schemes, atom sources, estimates of laser power requirements, and references. Also included are the results of calculations of excited state photoionization cross sections by Hartree-Fock techniques. Data sheets for additional elements will be prepared in the future.

CRITICAL DATA FOR REPLACEMENT REFRIGERANT

There is a concerted effort by the nation's scientific community and industry to identify possible re-

placements for chlorofluorocarbons (CFCs) that are depleting the ozone layer in the stratosphere. One candidate is R123 (1, 1-dichloro—2, 2, 2-trifluoroethane), which has a much shorter atmospheric lifetime than R11 (trichlorofluoromethane). R123 has been proposed as a replacement for R11 as a foam-blowing agent. Scientists have recently determined the critical parameters of R123 that are fundamental to the development of equation-of-state models for the thermophysical properties of fluids. Knowledge of these and similar properties are essential to rapid and efficient replacement of ozone-depleting CFCs. The new critical parameters are: $T_c = 456.94$ K; $P_c = 36.74$; $\rho_c = 550$ kg/m³. Prior to these measurements the critical parameters had only been estimated.

DRAG AND TORQUE CALCULATIONS DEVELOPED FOR SHUTTLE TANKS IN LOW-EARTH ORBIT

NIST scientists have collaborated on the development of a computer algorithm needed for orbit and attitude control of large external Space Shuttle tanks which may be placed in long-term, low-altitude orbits.

Present practice is to discard these tanks, which weigh more than 30 t, after they have reached 98 percent of orbital velocity at an altitude of 100 km. There are compelling economic and environmental reasons for utilizing these tanks—they might serve as holding facilities, carry experiments, or be used as building components for larger structures in space—rather than letting them burn up upon re-entry into the atmosphere.

The algorithm has been implemented for calculating the aerodynamic drag and torque on such structures under the assumptions of free molecular flow theory. They divide the structures into circular cross sections, project these according to the angle of attack, and approximate the drag profile by the convex envelope of the projection ellipses.

SHORTEST WAVELENGTH x-RAY LASER DEVELOPED

NIST scientists have designed, in collaboration with private industry, a scheme for generating coherent radiation in the x-ray region between 10 and 100 Å. Preliminary measurements on a prototype device based on this scheme have recently been made and show evidence for lasing at 42.3 Å. If so, the device would be the shortest wavelength x-ray laser and the first to reach the so-called "water window" between 24 and 43 Å. This is the wave-

length region where carbon atoms will absorb radiation but water will not. An x-ray laser in this region could be used as a probe of the structure of living cells. The cell could be observed in its original state rather than having to be frozen, sliced, or stained as is necessary for techniques such as electron microscopy. Other uses of an x-ray laser are microlithography, plasma probing, and resonance excitation of atoms.

In this scheme, the laser is prepared by first ionizing a cloud of atoms to their zinc-like state. These ions are then further photoionized, leaving them in a metastable copper-like state. Since the ion decays slowly from this state, a population inversion builds up and lasing action takes place before the state decays. The x-ray laser device being tested combines an exploding foil, made of the lasing material, plus a second foil which, when exploded, generates photoionizing radiation. The lasing material is selected according to the desired laser wavelength, e.g., silver will provide a laser at 42 Å and dysprosium at 12 Å. Calculations also indicate that the population inversion will increase with decreasing wavelength, a significant occurrence since devices would become more efficient as they are pushed to their limits.

ATOMIC CLOCK USED TO TIME TRAFFIC LIGHTS

It was recently reported in *The Wall Street Journal* that a pioneering project involving the synchronization of Los Angeles County traffic lights with time signals provided by NIST is expected to save southern Californians thousands of hours of driving time a year and sharply cut fuel use and pollution. The time signals are derived from the NIST atomic clock and broadcast from the NIST radio station WWV in Fort Collins, CO. By tapping the precision of the timekeeping device, county officials say they can improve the timing of stoplights on major roads to allow traffic to flow more smoothly at posted speeds.

NIST scientists assisted in this project by working with industry to provide additional broadcast information in the WWV time code that enhances the usefulness of unattended, WWV-based clocks in such applications. Advantages of the new system include automated time resetting after a power outage, automated adjustments for daylight saving time changes, and elimination of the need for expensive wiring to central control systems. Seattle, WA and Dayton, OH are also planning to test the system.

TWENTY DEVICES PASS MAC VALIDATION TESTS

To date, 20 devices have successfully passed the National Computer Systems Laboratory conformance tests using the message authentication code (MAC) validation system (MVS). The system was developed to assist the Department of the Treasury with a program to certify message authentication devices for electronic funds transfer (EFT). The MVS tests message authentication devices for conformance to two data authentication standards: FIPS 113, Computer Data Authentication, and ANSI X9.9-1986, Financial Institution Message Authentication (Wholesale).

The MVS uses telephone lines to perform automated testing on message authentication devices which are remote to NIST. The testing facility is implemented on a personal computer equipped with a data encryption standard (DES) encryption board. Accessing the MVS by means of a remote bulletin board, assigned identifiers, and password pairs, the user selects one or more of five authentication options (one binary authentication option and four coded character set options). All applicants must successfully complete the binary option, but the combination of coded character set options to test is left to the discretion of the applicant.

NCSL has also developed a key management validation system (KMVS) to test key management devices for conformance to ANSI X9.17, Financial Institution Key Management (Wholesale). ANSI X9.17 has numerous options which allow flexibility for various applications. A subset of these options is being considered for federal government use.

DECISION SUPPORT SOFTWARE FOR AUTOMATED MANUFACTURING INVESTMENTS

A microcomputer program, AutoMan, has been developed to support multi-attribute decisions about automated manufacturing investments. This work was done in collaboration with NIST researchers, the Navy, and private industry. AutoMan is unique in permitting users to combine quantitative and qualitative criteria in evaluating investments. Quantitative criteria may include such traditional financial measures as life-cycle cost and net present value as well as such engineering performance measures as throughput and setup time. Qualitative criteria may include flexibility and product quality.

The user first specifies the criteria and investment alternatives and then establishes weights for

be used to record, store, and process information about an organization's data and data processing resources. The new standard adopts a voluntary industry standard ANSI X3.138-1988. NIST and the American National Standards Institute (ANSI) worked together for several years to develop the technical specifications for IRDS. In addition, NIST has developed prototype software which implements the standard. For further information contact Alan Goldfine, NIST, A266 Technology Bldg., Gaithersburg, MD 20899; telephone: 301/975-3252. The FIPS publication will be available from the National Technical Information Service, Springfield, VA 22161.

WORLD'S SMALLEST PRISM MADE AT NIST

Researchers at the NIST laboratories in Boulder, CO, have created what they believe to be the smallest optical prism ever made. The microscopic glass prism is only 5×10^{-3} in on a side—about the thickness of a heavy sheet of paper. Barely visible to the naked eye, the "microprism" may be used in micro-optics and fiber optics research and instrumentation—for example, as a test probe for making accurate measurements of the performance characteristics of optical fibers in the tight confines of an integrated optical circuit. Besides being measuring tools, microprisms might also eventually have applications as actual elements in miniaturized optical circuits. A guest scientist at NIST developed the procedure to grind the infinitesimal prism in conjunction with a NIST physicist.

PROGRAM ON HIPING OF METAL POWDERS ESTABLISHED

The hot isostatic pressing (HIPing), or consolidation of rapidly solidified metal powders into near-net, or close-to-final, shapes, may be a very reliable way to make parts out of advanced alloys such as titanium aluminide. A team of scientists and engineers from industry, universities, and government are working to develop the measurement and control tools needed to automate the HIPing process. The collaborative effort is jointly sponsored by NIST and the Defense Advanced Research Projects Agency (DARPA). For titanium-aluminide alloys, rapidly solidified powders are sealed in a canister or mold and placed inside a furnace. The material is heated to approximately 1100 °C and compressed into solid shapes by hydrostatic pressures up to 200 MPa, or 30,000 psi. Under the collaborative effort, researchers are

developing sensors, process models, and an "expert" computer system to automate the entire production cycle from raw powders to finished parts. For information on the cooperative HIPing program, contact: Dr. Robert J. Schaefer, NIST, A153 Materials Bldg., Gaithersburg, MD 20899; telephone: 301/975-6162.

AGREEMENTS REACHED ON OSI IMPLEMENTATIONS

The second version of stable implementation specifications for OSI (Open Systems Interconnection) protocols has been agreed to and is now available. These agreements are based on recognized international OSI standards and were reached by vendors and users participating in the NIST Workshop for Implementors of OSI. They support the second version of the Federal Information Processing Standard for GOSIP (Government Open Systems Interconnection Profile), which is expected to be proposed later this year. The agreements are considered advanced enough for use in product and test suite development. Stable Implementation Agreements for Open Systems Interconnection Protocols, Version 2 Edition 1 (NIST SP 500-162) is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Order by stock no. 003-003-02921-1 for \$26 prepaid.

FIRST 200 LABORATORIES ACCREDITED FOR BULK ASBESTOS

More than 200 laboratories received the first accreditations to perform analysis for asbestos content in bulk insulation and building materials under the new National Voluntary Laboratory Accreditation Program (NVLAP) for bulk asbestos in schools. The laboratories have demonstrated their competence to analyze bulk material samples by polarized light microscopy (PLM) using test method procedures specified by the Environmental Protection Agency (EPA). Approximately 500 other laboratories are being evaluated to determine their ability to meet NVLAP requirements. The accredited laboratories have undergone an on-site assessment performed by a technical expert in optical microscopy and have demonstrated full compliance with NIST technical evaluation criteria. The laboratories also have successfully participated in the first round of proficiency testing in which they were required to determine the presence and type of asbestos in pre-characterized quality assurance

materials developed by NIST. For information on NVLAP, contact: National Voluntary Laboratory Accreditation Program, NIST, Building 411, Gaithersburg, MD 20899; telephone: 301/975-4016.

LASER-PUMPED CESIUM CLOCK UNDER DEVELOPMENT

A new atomic clock is being developed at NIST that should improve short-term stability and frequency uncertainty to about 10 times better than the present national standard. The new clock, which will be accurate to 1 s in 3 million years, is the first to use laser light instead of magnetic fields for cesium atom state selection and to use photoelectric fluorescence detectors instead of hot-wire ionization for detection. The major construction phase is complete, and researchers are currently testing subsystems of the new clock, which uses state-of-the-art laser control and vacuum systems. Other advances in laser technology, frequency control servosystems, and microwave cavity design are also incorporated. The new clock will use counter-propagating beams of cesium atoms, thus reducing errors caused by asymmetries in the device. Other features will provide more flexibility and control of microwave power, modulation parameters, magnetic C-field strength, and cavity phase shift, enabling higher accuracy operation and simpler evaluation of the clock's performance.

NIST ASKING FOR COMMENTS ON POSIX REVISION

A Federal Information Processing Standard (FIPS) for POSIX, a portable operating system interface, was approved in September 1988 as the first step toward a more open software environment for Federal agencies. POSIX defines the interface, or link, between applications and computer operating systems based on UNIX, originally developed by AT&T. The initial FIPS, which was based on an Institute of Electrical and Electronics Engineers (IEEE) draft standard, was issued to enable federal agencies to begin specifying POSIX in procurements. Now NIST is planning on revising the standard to adopt the final IEEE standard 1003.1-1988 (Portable Operating System Interface for Computer Environments). Comments on the proposed revision must be received by July 12, 1989. They should be sent to NIST, Attn: Revision of FIPS 151, B154 Technology Bldg., Gaithersburg, MD 20899. For further information, contact Roger Martin at NIST, telephone: 301/975-3295.

Standard Reference Materials

STANDARD REFERENCE MATERIAL 1588—ORGANICS IN COD LIVER OIL

Standard Reference Material (SRM) 1588, Organics in Cod Liver Oil, is now available from the NIST Office of Standard Reference Materials. It is intended primarily for use in developing and validating analytical methods for the determination of selected chlorinated pesticides, chlorinated biphenyls, and alpha-tocopherol in cod liver oil and other similar complex lipophilic matrices, and should be of particular interest to food scientists.

The Certificate of Analysis for SRM 1588 provides certified concentrations for six chlorinated pesticides, five chlorinated biphenyls, and alpha-tocopherol. The chlorinated pesticides are hexachlorobenzene, alpha-HCH, trans-chlordane, cis-chlordane, trans-nonachlor, and dieldrin. The chlorinated biphenyls, identified according to the numbering scheme in K. Ballschmiter and M. Zell, *Fresenius Z. Anal. Chem.* **302**, 20 (1980), are PCB 101, PCB 138, PCB 153, PCB 170, and PCB 180. The nominal concentrations of the pesticides range from 50 ng/g for trans-chlordane to 209 ng/g for trans-nonachlor; and, of the PCBs, from 45 ng/g for PCB 170 to 276 ng/g for PCB 153. The nominal concentration of the alpha-tocopherol is 112 µg/g.

The certified concentrations of the pesticides and PCBs are based on analyses using independent procedures based on gas chromatography with electron capture detection and gas chromatography with mass spectrometric detection. The certified concentration of alpha-tocopherol is based on analytical determinations based on two high-performance liquid chromatography methods—one, a normal phase procedure, the other, a reversed phase procedure.

In addition to the certified concentrations, the Certificate of Analysis provides noncertified concentrations of six added polychlorodibenzo-p-dioxins and octachlorodibenzofuran. The concentrations, ranging from 0.21 ng/g for 2,3,7,8-tetrachloro-dibenzo-p-dioxin to 1 ng/g for octachlorodibenzofuran, are based on the mass of the compound added to the mass of oil. SRM 1588, Organics in Cod Liver Oil, is available for \$199 per set of five sealed vials from the Office of Standard Reference Materials, NIST, B311 Chemistry Bldg., Gaithersburg, MD 20899; telephone: 301/975-6776.

STANDARD REFERENCE MATERIAL 1598— INORGANIC CONSTITUENTS IN BOVINE SERUM

A bovine serum Standard Reference Material (SRM 1598), certified for trace elements of clinical importance, is now available from the Office of Standard Reference Materials. SRM 1598 was developed primarily for use in calibrating instrumentation and evaluating the accuracy of analytical methods for selected trace elements in blood serum, plasma, and similar biological fluids.

The Certificate of Analysis provides certified concentrations and uncertainties for 13 elements. The nominal concentrations of the elements listed in ng/g are: aluminum (3.7), cadmium (0.089), chromium (0.14), cobalt (1.24), manganese (3.78), molybdenum (11.5), and selenium (42.4); and those listed in ng/g are: copper (0.72), iron (2.55), magnesium (20.0), potassium (196), rubidium (0.17), and zinc (0.89). The concentrations are based on the agreement of results by at least two independent methods. In addition, non-certified concentrations are provided for Ca, Na, As, Cs, Pb, Hg, Ni, Tl, and V.

The serum was produced at the U.S. Department of Agriculture facilities in Beltsville, MD. The dairy cows had been inspected and found to be free of any disease or pathological conditions.

The concentrations of certain trace elements in serum change during the course of specific diseases in animals and humans. For example, low serum selenium has been associated with a number of human diseases, such as Keshan disease, increased risk for coronary heart disease, and possibly, cancer. Reliable trace element determinations in serum are also important for nutrient bioavailability studies and nutrient monitoring during parenteral feeding. Because of the similarity of human and bovine sera, SRM 1598 should be useful in validating trace element methodology and experimental data.

NEW VALUE FOR THE ATOMIC WEIGHT OF NICKEL DETERMINED

Absolute values have been obtained for the first time for the isotopic abundance ratios of a reference sample of nickel (Standard Reference Material 986) using thermal ionization mass spectrometry. Samples of known isotopic composition, prepared from nearly isotopically pure separated nickel isotopes, were used to calibrate the mass spectrometers. The resulting absolute isotopic ratios are: $^{58}\text{Ni}/^{60}\text{Ni} = 2.596061 \pm 0.000728$, $^{61}\text{Ni}/^{60}\text{Ni} = 0.043469 \pm 0.000015$, $^{62}\text{Ni}/^{60}\text{Ni} = 0.138600 \pm$

0.000045 , and $^{64}\text{Ni}/^{60}\text{Ni} = 0.035295 \pm 0.000024$, which yield atom percents of $^{58}\text{Ni} = 68.076883 \pm 0.005919$, $^{60}\text{Ni} = 26.223143 \pm 0.005144$, $^{61}\text{Ni} = 1.139897 \pm 0.000433$, $^{62}\text{Ni} = 3.634529 \pm 0.001142$, and $^{64}\text{Ni} = 0.925543 \pm 0.000599$. The atomic weight calculated from this isotopic composition is 58.693351 ± 0.000147 . The indicated uncertainties are overall limits of error based on two standard deviations of the mean and allowances for the effects of known sources of possible systematic error.

The International Union of Pure and Applied Chemistry Commission on Atomic Weights and Isotopic Abundances lists the present value of the atomic weight of nickel (58.69 ± 0.01) as one of the least well known atomic weights. Nickel is also one of the few remaining elements where the atomic weight is based, at least in part, on chemical determinations made in the early 1920s. Based on this work, a value of 58.6934 ± 0.0002 could be recommended which is several orders of magnitude more precise than the presently accepted value and, most important, is now known on an absolute scale.

"STANDARD CRACK" CAN HELP FIND METAL FATIGUE

A "standard crack" recently developed at NIST can help the airline industry do a better job of testing for metal fatigue in aircraft. Eddy current testing is the method most often used to detect the cracks, normally invisible to the naked eye, that lead to failure. A difficulty of the eddy current technique is the lack of samples of well-defined "flaws" that accurately simulate fatigue cracks. These are necessary to calibrate accurately eddy current instruments and to provide base data for interpreting test results. Now engineers at NIST's Boulder, CO, laboratories have invented a technique for producing artificial flaws of known sizes which can be used to calibrate test equipment. NIST's Office of Standard Reference Materials in Gaithersburg, MD, will sell 3- by 2-in blocks of metal containing these standard defects. The initial offerings will be research prototypes and should be available by mid-June. Inquiries concerning the purchase of these materials should be made to the Office of Standard Reference Materials, NIST, B311 Chemistry Building, Gaithersburg, MD 20899; telephone: 301/975-6776.

MATERIAL CAN HELP PINPOINT NICOTINE EXPOSURE

Researchers studying human exposure to cigarette smoke, both active and passive exposure, need to ensure that the methods they use to track the concentration of nicotine by-products in urine samples are reliable. A new bottled reference material (RM), issued jointly by NIST and the Environmental Protection Agency, can assist laboratories in validating urine measurement methods. It is designed for determining levels of cotinine, which is the major urinary metabolite of nicotine. With the new material, laboratory personnel can test the reliability of instruments and methods by analyzing the RM the same way as a urine sample and comparing results with the ones listed for the RM. The new material is sold in a kit that includes vials of freeze-dried urine each containing cotinine at one of three levels: blank, low, and high. These quantities are typical of, respectively, nonsmokers with no exposure to cigarette smoke, nonsmokers with passive exposure to smoke, and smokers. The RM (Number 8444) costs \$148 and is available from the Office of Standard Reference Materials, NIST, B311 Chemistry Bldg., Gaithersburg, MD 20899; telephone: 301/975-6776.

NEW SRM REPORT CONTAINS MICROSPHERE EXPERIMENTS

A series of microscope experiments for students is described in a NIST report on the construction, preparation, and recommended uses of Standard Reference Material (SRM) 1965, Microsphere Slide, 10- μ m Polystyrene Spheres. The SRM is a microscope slide with the first commercial product made in space, the 10- μ m polystyrene spheres, deposited on it. The SRM is an education tool as well as a standard to calibrate microscopes for small particle measurements. The spheres are arranged in two types of groupings. One is an "unordered" arrangement, resembling strings of beads. The other grouping is an "ordered" two-dimensional hexagonal array for use as a microlength standard and to act as a "stage" micrometer. Copies of *Description of the SRM 1965 Microsphere Slide* (SP 260-107) are available prepaid for \$3.75 from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Order by stock no. 003-003-02911-4. SRM 1965 is available for \$105 from the Office of Standard Reference Materials, NIST, B311 Chemistry Bldg., Gaithersburg, MD 20899; telephone: 301/975-6776.

NEW LOW-ALLOY STEEL CALIBRATION STANDARD AVAILABLE

A new standard for checking and calibrating oxygen and nitrogen analyzers in the steel industry has been developed under a cooperative program between the American Society for Testing and Materials (ASTM) and NIST. Information on the concentrations of these gases is important to the properties of steel because they contribute markedly to steel brittleness and therefore to the strength and durability of steels. Standard Reference Material (SRM) 1754, Oxygen and Nitrogen in Low-Alloy Steel, AISI 4320, is in rod form, 0.95 \times 0.95 \times 10.2 cm (3/8 \times 3/8 \times 4"). The new SRM was certified through the NIST/ASTM Research Associate Program involving nine industrial laboratories. SRM 1754 is available for \$119 per unit of 1 rod from the Office of Standard Reference Materials, NIST, B311 Chemistry Bldg., Gaithersburg, MD 20899; telephone: 301/975-6776.

Standard Reference Data

NEW NIST GAS KINETICS DATABASE AVAILABLE FOR PCs

A new computerized database with an extensive compilation of information on the rates of chemical reactions important to research chemists, environmental scientists, and combustion engineers has been developed by NIST scientists. Available on a floppy disk for personal computers (PCs), it contains data on the rates of approximately 2,000 chemical reactions with more than 5,300 individual data entries. The database is an important tool for modeling combustion systems or chemical processes occurring in the atmosphere. This type of data is necessary in understanding the reactions of chemicals and their role in depleting the Earth's ozone layer. A special software option allows users to display rapidly in a single graphic all of the rate constants determined for a single chemical reaction as a function of temperature. These plots showing all of the available information are useful for revealing discrepancies in experimental results. NIST Standard Reference Database 17, Gas Kinetics, is available for \$190 from the Office of Standard Reference Data, NIST, A320 Physics Bldg., Gaithersburg, MD 20899; telephone: 301/975-2208.

**MAJOR REFERENCE WORK ON ATOMIC
DATA PUBLISHED**

After about 10 years of detailed data evaluation and compilation work, two major volumes of atomic transition probability data have been published as Supplements 3 and 4 to Volume 17 of the *Journal of Physical and Chemical Reference Data*. The books, about 500 pages each, contain data for approximately 18,000 spectral lines of the transition metals scandium through nickel for all stages of ionization. The largest amount of data, about 5,000 transitions, is available for iron. All data have been critically selected and are listed with estimated accuracies in the range from a few percent up to 50 percent for weaker lines.

The books are a continuation of a series started at NIST with two earlier volumes on lighter elements published in 1966 and 1969. These atomic reference data are widely used by the plasma physics, astrophysics, atomic physics, and spectrochemical communities. The earlier volumes have been cited about 2,000 times each.