EQUIPMENT NEWS

The information reported here is obtained from manufacturers and from other sources considered to be reliable. Science *does not assume responsibility for the accuracy of the information. All inquiries concerning items listed should be addressed to* Science, *Room 740, 11 W. 42 St., New York 36, N.Y. Include the name(s) of the manufacturer(s) and the department number(s).*

■ MILLIVOLT RECORDER has sensitivity as high as full scale for 1 mv. A high-gain, chopper-type amplifier feeds a standard 5 ma d-c measuring mechanism with less than 1 μa drain on the measured circuit. Response time for full-scale deflection is ¾ sec. Synchronous-motor chart drive or 60-day spring-motor drives are available. Four ranges, 1, 2, 5, or 10 mv, are selectable by change of a plug-in resistor. (General Electric Co., Dept. S549)

■ TRANSISTOR POWER SUPPLY furnishes d-c power variable from 0.5 to 7.0 v. A maximum current of 300 ma is furnished. Ripple is less than 1 mv at full load. Regulation is 50 mv over the input range 105 to 125 v a-c. Internal impedance is 0.5 ohm. (Kay Electric Co., Dept. S532)

■ RADIO-FREQUENCY PROBE is transistorized. Gain is unity, stabilized by a feedback amplifier. Frequency response is 1 db down at 50 cy/sec and 12 Mcy/sec, 3 db down at 20 cy/sec and 15 Mcy/sec. Input impedance is 4 μμf and 100 kohm. Output impedance is 50 ohm. (Kay Electric Co., Dept. S553)

■ FREQUENCY INDICATOR counts events during 0.1-, 1-, or 10-sec intervals. Maximum count rate is 100,000/sec. Glow transfer tubes are used for counting and for display. The indication may be recorded on standard printer tape. Input sensitivity is 50 mv. Automatic-recycle or single-reading modes of operation are available. (Electro-Pulse Inc., Dept. S534)

■ VACUUM DISTILLATION UNIT has a capacity of up to 200 lb/hr. The equipment is designed for push-button operation. A film-type preheater-degasser is a feature of the still. All instruments necessary for operation are incorporated in a control panel. (Arthur F. Smith Co., Dept. S503)

■ HELICAL RECORDER records analog data in the range from direct current to 35 cy/sec. Heat-sensitive paper is used for the record, a sheet 38 by 11⅞ in. accommodating a spiral record up to 1360 ft long. Paper speed and trace separation can be varied. Two-thirds of the record is visible at any time. (Geotechnical Corporation, Dept. S504)

■ PRESSURE TRANSDUCER converts a 3- to 15-lb/in.^{2} signal to a proportional a-c signal. Motion of a pressure capsule is sensed by a differential transformer. Accuracy is said to be ± 0.25 percent of full scale. (Fischer and Porter Co., Dept. S517)

■ DIGITAL OHMMETER permits measurement of resistance from 10 mohm to 10 Mohm with a single instrument. Accuracy ranges from ± 0.1 to 0.01 percent depending on the range of resistance being measured. Readout time is approximately 1 sec. The instrument is based on a switching unit containing three arms of a Wheatstone bridge. (Electro Instruments Inc., Dept. S521)

■ IGNITION APPARATUS is suitable for determination of ignition temperatures of plastics and other solids and for evaluation and classification of combustible materials. (Custom Scientific Instruments, Inc., Dept. S522)

■ NEUTRON COUNTER features a subminiature preamplifier constructed into a BF_3 detector tube to allow the detector assembly to be operated 50 ft or more from the equipment into which it feeds. Fast neutron response is constant from 100 kev to 5 Mev. Sensitivity is 560 count/min per neutron, per second, per square centimeter for a Po-Be source. (Tullamore Electronics Laboratory, Dept. S524)

■ LEAK DETECTOR of the helium-mass-spectrometer type can detect a leak rate of 1×10^{-10} standard cubic centimeters of air per second. Response time may be as low as 2 sec. The instrument has been specifically designed for simplicity in use and maintenance. The mass-spectrometer tube can be removed and replaced without shutting down the vacuum system. (General Electric Co., Dept. S531)

■ HARDNESS TESTER reduces operator fatigue by motorization of the major load. Elimination of human variability in application of load is also said to contribute improved accuracy. Standard models have 8- and 12-in. vertical capacity. Special models with 4- and 16-in. capacity are available. (Torsion Balance Co., Dept. S523)

■ PRESSURE PICKUP is capable of operating continuously at 500°F. The pickup is based on the unbonded-strain-gage principle, whereby displacement of a diaphragm is sensed by strain-gage resistors arranged in a bridge circuit. Compensation for wide variations of ambient

temperature is provided by locating the two inactive arms of the bridge in close proximity to the active windings. (Consolidated Electrodynamics Corp., Dept. S551)

■ POWER SUPPLY, fully transistorized, supplies 100 to 150 v at 0 to 1.5 amp, regulated to better than ± 0.1 percent against either line or load changes. Ripple is less than 1.0 mv. The supply dissipates less than 50 w to deliver 225 w. (NJE Corp., Dept. S505)

■ ELECTRONIC FIBER-FINENESS INDICATOR scans a sample of fibers on a slide, measuring fiber diameter and computing an average. The image cast by each fiber as it passes through a light beam is presented to a multiplier phototube which produces an electric signal starting at the time the leading edge is seen and persisting until the trailing edge passes. The duration of the signal is a measure of diameter. The signal durations are counted for 1000 fibers, providing an average diameter. (National Research Corporation, Dept. S552)

■ THERMAL WIRE STRIPPER is designed for use with Teflon insulated wire. Interchangeable electrodes are available to handle wire from A.W.G. Nos. 14 to 32. Operation is on 15-v alternating current. (Contact, Inc., Dept. S555)

■ SILICON MONOMER, pentamethyldisiloxanemethylmethacrylate, can be copolymerized with acrylonitrile, styrene, vinyl acetate, and methyl methacrylate to yield plastics with unusual properties. A 30-percent copolymer with methylmethacrylate, for example, exhibits a coefficient of friction against steel of 0.03 as compared with 0.05 for polytetrafluoroethylene. (Dow Corning Corporation, Dept. S533)

■ TAPE READER will read ten transverse rows of eight holes each in a perforated tape. Standard 1-in. tape with holes on 0.1-in. centers is accommodated. The reader will operate continuously at a rate of 6 frames per second. (California Technical Industries, Dept. S554)

■ RECORDING POTENTIOMETER features two pens, each writing margin-to-margin on a single 5-in. strip chart. Accuracy is ± 0.5 percent, and sensitivity 0.14 percent, of scale span. Input impedance is 1000 ohm/mv. (Westronics, Inc., Dept. S556)

■ AMPLIFIER for low-level signals from thermocouples, strain-gage bridges, and resistance-bridge transducers features floating input. Gain is variable from 5 to 100. Linearity is 0.05 percent, and long-term stability is ± 5 μv. Input impedance is greater than 1.5 Mohm. (Neff Instrument Corp., Dept. S557)

■ PEAK VOLTAGE COMPARATOR measures the ratio of two peak voltages at frequencies up to 1000 cy/sec regardless of phase, frequency, or polarity. The ratio is displayed on a direct-reading dial with accuracy of ± 0.1 percent. (Cal-Tronics Corp., Dept. S536)

■ WINDOWLESS CHROMATOGRAM SCANNER employs a small flow counter with low background. In combination with a scaler, it can count odd-shaped, low-activity samples up to 1 in. in diameter. Operation can be either in the Geiger or the proportional region. (Forro Scientific Co., Dept. S565)

■ ISOLATION AMPLIFIER has selectable bandwidths from 2 cy/sec to 1.7 Mcy/sec. Gain is selectable in decades from 0.1 to 1000. Input impedance is 400 Mohm and 3μμf. Noise is below 10 μv with 150 kcy/sec response. (Keithley Instruments, Inc., Dept. S563)

■ DYNAMOMETER is used as an accessory for determination of power required for mixing non-Newtonian fluids and gas-liquids. The accessory, used with an experimental agitator, transmits motor torque to the pan of a laboratory scale. (Chemineer, Inc., Dept. S541)

■ SIGNAL GENERATOR incorporates a backward-wave oscillator which can be electronically swept to cover the frequency range from 1 to 15 kMcy/sec. Each unit includes modulating circuits, power supplies, and a microwave oscillator. Operation is an 117-v alternating current. (Wave Particle Corp., Dept. S550)

■ DENSITOMETER reads optical density linearly from 0 to 4.0. Color filters, with separate zero adjustments for each filter, permit measurement of colored material. Both reflection and transmission measurements are made. (Macbeth Instrument Corp., Dept. S547)

■ GLASS OBSERVATION WINDOW assembly, of multiple, dry-air insulating construction, is capable of withstanding temperature cycles from − 100° to + 500°F. The units are said to be effective at high altitude and in vacuum. Sizes range from 13 by 13 to 40 by 40 in. (Duo-Pane Corp., Dept. S495)

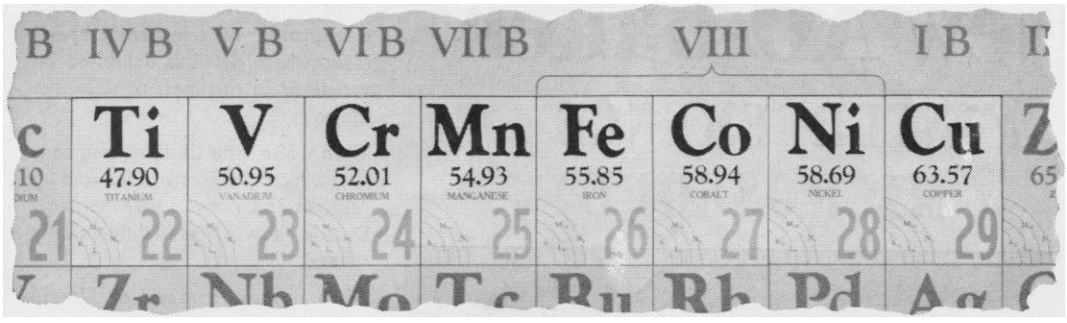
■ ALTIMETER for altitudes from 75,000 to 225,000 ft is based on the thermocouple vacuum-gage principle. The thermopile elements of the instruments are compensated for ambient temperature and for rate of change of temperature. Response time is a few hundredths of a second. Output is a d-c voltage. Operation is on 115 v a-c. (Hastings Raydist, Inc., Dept. S477)

JOSHUA STERN
National Bureau of Standards

QUICK DETECTION OF PARAMAGNETIC IONS

E-P-R AT WORK **7**

(Electron Paramagnetic Resonance)



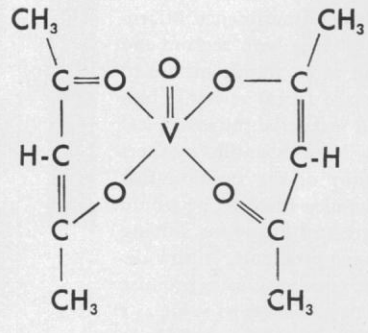
Where a trace of a transition element ion constitutes either a harmful impurity or a key to a chemical, physical or biological phenomenon, quantitative determination by E-P-R spectroscopy has a number of advantages. The test is fast and non-destructive. A typical sample size is 0.1 cc and the method is effective on concentrations as low as 10^{-6} molar. On a routine basis a quantitative E-P-R test can be made in a few minutes. The same results by chemical analysis might require hours or days of painstaking effort.

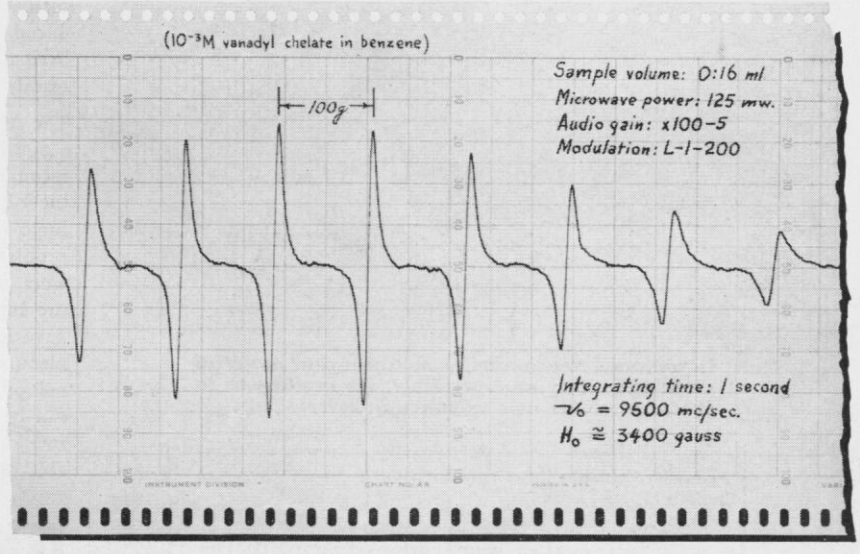
E-P-R Spectroscopy is effective on most transition element ions because the unfilled electronic shell causes the ion to be paramagnetic. Each ion yields a characteristic E-P-R spectrum which identifies its presence and concentration. By further interpreting this spectrum, the scientist can also determine configuration mixing and magnitudes and symmetries of microscopic electrostatic fields at the paramagnetic ion site. An example is shown below.

Number 7 of a series **PARAMAGNETIC RESONANCE ABSORPTION IN VANADYL CHELATE**

INTERPRETATION: Metallo-organic compounds are of great interest in biochemistry and chemistry. The subclass of compounds called "chelates" offers many practical applications for EPR in determinations of structure, valence states, and qualitative and quantitative analyses. The spectrum recorded from V^{+4} in vanadyl acetyl acetonate is shown below.

The eight lines result from the $2I+1$ equally probable orientations of the $(I=7/2)$ V^{51} nucleus, and all apparently have the same absolute intensity despite the assymmetry. The variation in these differentiated signals is due to variation in the line-widths — a phenomenon which reveals the contribution of the hyperfine interaction to the electronic relaxation.





For full technical details on E-P-R and N-M-R Spectroscopy and Spectrometers, write to the Varian Associates Instrument Division

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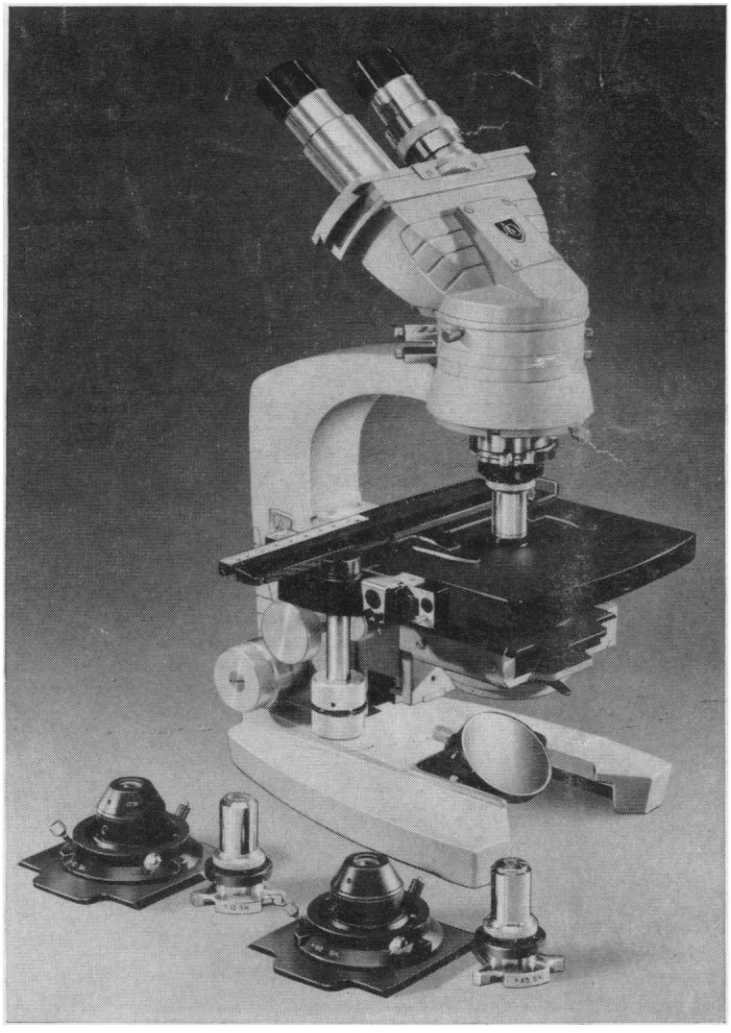

If you need to examine or measure your material more effectively and precisely, we invite you to investigate this new advance in microscopy.

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The NEW AO-Baker Interference Microscope is the unique combination of a double beam interferometer and polarizing microscope. It dramatically provides for the precise examination of transparent specimens where detail is exhibited by variations in thickness or refractive index.

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With monochromatic or filtered light, interference contrasts can be varied from bright to dark and relative optical thicknesses are measurable to an optimum accuracy of 1/300 wave length.

Interference Contrast Microscopy like Phase Contrast Microscopy depends on the nature of the specimen detail to retard light — by virtue of refractive index and thickness — and does not depend on the property of the specimen to absorb light. In this connection the AO-Baker Interference Microscope is similar to the conventional Phase Contrast Microscope.

The principle of the Phase Contrast Microscope depends upon light diffraction for its contrast effects — the AO-Baker Interference Microscope does not. By means of the unique built-in interferometer, mutually interfering beams are produced, recombined, and if the two beams suffer relative retardation, readily visible contrast results.

The AO-Baker Interference Microscope has already won acclaim and recognition as an important aid to the solution of a great variety of biological and industrial microscopical problems. Most scientific workers were *initially* of the opinion that the Interference Microscope would have its greatest utility for solving measurement problems. It now develops that equal or greater promise can be expected from its value as a method of variable phase and variable color contrast.

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