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).*

■ LIQUID-LEVEL GAGE, for use when no escape of liquid or vapor can be tolerated, indicates by means of a magnetically actuated scale. The gaging mechanism is contained in a stainless-steel chamber. The scale consists of a series of edge-magnetized wafers, one side finished in red, the other in silver. Changes in level operate a float which magnetically turns the wafers over. The boundary between the red and the silver wafers indicates the liquid level. (Jerguson Gage and Valve Co., Dept. S803)

■ BATTERY, 1¼ in. long by ⅜ in. in diameter, furnishes 95 v. A steady current of 10^{-9} amp can be supplied for 176,000 hr at 70°F with 10 percent voltage drop. Flash current of 20 μa can be obtained. Shelf life is greater than 20 yr. (Universal Winding Co., Dept. S823)

■ AUTOMATIC CHECK-WEIGHING MACHINES are available in capacities from 1 g to 100 lb. Accuracies from 1 part in 5000 to 1 part in 20,000 are attainable. Automatic transfer mechanisms place items on, and remove them from, the weighing element. The actual weight of the object is indicated visually on a scale. An optical control system consisting of crystal photocells on adjustable mountings alongside the scale check the weight against preselected limits. Weighing rates from 30 to 120 per minute are available. (Exact Weight Scale Co., Dept. S821)

■ CONTACT-MAKING METERS combine panel indicating instruments with thyratron relay control units. The instruments conform to ASA specifications for portable secondary standards. Contact make or break value is continuously variable and is accurate to 0.25 percent. The relay is rated at 5 amp, 115 v, a-c noninductive. Response time varies with application from a few milliseconds to 2 sec full scale. (Sensitive Research Instrument Corp., Dept. S822)

■ CRYSTAL OVEN uses the latent heat of fusion of crystalline materials to provide constant temperatures. At 24°C ambient, cavity temperature is 70.6°C. Temperature control is within ±0.5° from −20° to +50°C ambient and approximates ±0.005°C at fixed ambient. Input voltage is 5 v a-c or d-c, regulated to ±2 percent. (Robertshaw Fulton Controls Co., Dept. S807)

■ HYDROGEN DISCHARGE TUBE furnishes high-intensity hydrogen Balmer lines. The gas atmosphere within the lamp is water vapor, which furnishes hydrogen atoms and ions. Molecular hydrogen formed during the discharge, which would produce a background, continuous spectrum, is continuously purged and converted to water vapor by a cartridge inside the electrodes. The lamp, which is constructed of Vycor and Pyrex glass, operates continuously at powers up to 75 w. (Robert K. Hassler Co., Dept. S827)

■ AIRBORNE FLASH LAMP provides high-intensity light for tracking missiles, target planes, or balloons. The light consists of a photoflash lamp assembly and a pulsing circuit. Flash repetition rate is 2 to 3 flashes per second. Ambient temperature range is −55° to +130°F. Operation is on 28, 14, or 7 v d-c; the power requirement is 50 w. (Research Inc., Dept. S809)

■ STRIP CAMERA will photograph on a continuous strip of film such objects as oil-field and mining cores, log charts, and strip charts. The camera loads with 60 ft of color or black-and-white 70-mm film. The subject may be 12 ft long and 2.25 in. wide. Exposure is made at the rate of 3 in./sec. Focus is automatically maintained. (Bill Jack Scientific Instrument Co., Dept. S814)

■ MICROTOME permits the operator to cut ultrathin and thick sections alternately, for use in electron and light microscope comparisons. Sections 0.025 μ thick can be obtained. A tissue-thickness selector permits the operator to adjust to thicknesses from 0.025 to 0.5 μ. Ivan Sorvall Inc., Dept. S824)

■ INERTIA SWITCH is actuated by thrusts, impacts, or excessive vibration. Once actuated, the switch will remain open until it is reset manually. Thrust duration of 1/30 sec or greater is required to open the switch. Factory settings from 1.5 to 10 g can be supplied. (Minneapolis-Honeywell Regulator Co., Dept. S825)

■ CULTURE APPARATUS provides a constant flow of nutrient liquids used to maintain a microorganism population of constant conditions. The apparatus can be furnished with a glass feeder and growth tube or as a complete assembly. (Delmar Scientific Laboratories, Dept. S828)

JOSHUA STERN
National Bureau of Standards

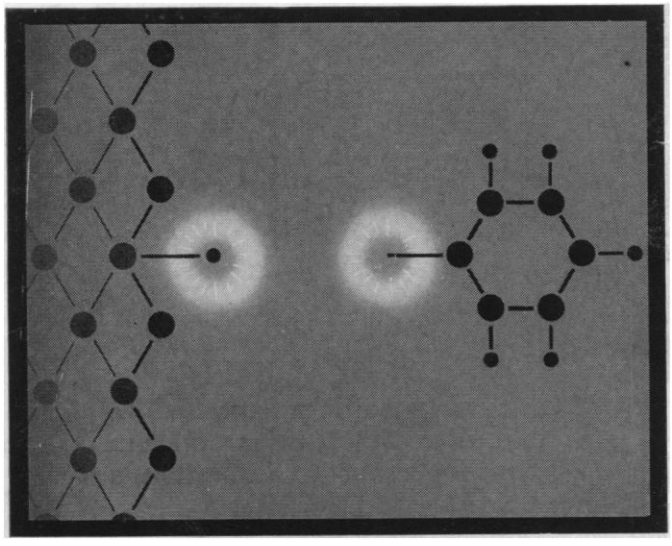
A MAJOR CLUE TO BIOCHEMICAL REACTIONS

which E-P-R Spectroscopy furnishes the biologist

E-P-R AT WORK

(Electron Paramagnetic Resonance)

10
E-P-R AT WORK



Is the odd molecule (or free radical) a necessary participant in most bio-chemical reactions? E-P-R's unique ability to determine its presence, identity, quantity and frequency of reaction can help unravel the vast complexities of life's chemistry. E-P-R spectroscopy is based on gyromagnetic properties of electrons and is particularly applicable to photosynthesis, enzyme substrate reactions, polymerization and radiation damage.

No other technique makes the same positive identifications. E-P-R Spectroscopy is singularly exclusive, "seeing" principally odd molecules and transition-element ions. It reveals quantity and identity, by measuring interaction of the odd electron with its surrounding nuclei. From E-P-R signals under varying temperature and chemical environments, the scientist can determine reaction kinetics.

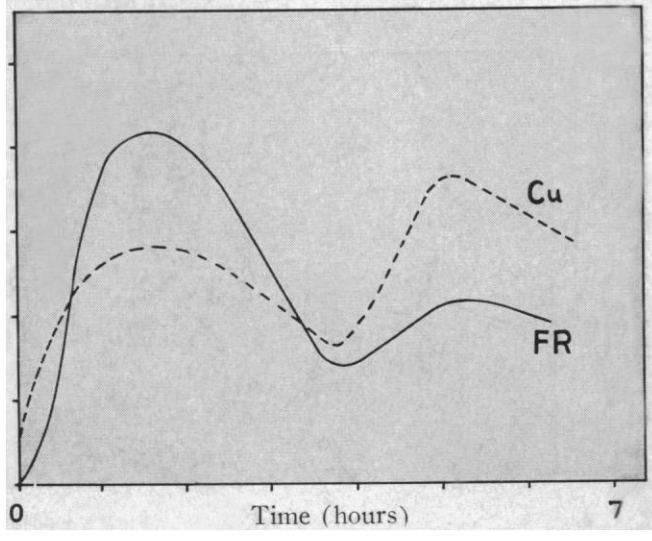
E-P-R spectroscopy is non-destructive to life or chemical processes. Typical sample is 0.15 cc in a quartz tube. Concentration of the odd molecule can be as low as 10^{-8} molar if adequately separated from signal-masking impurities. Example below is one of a continuing series.

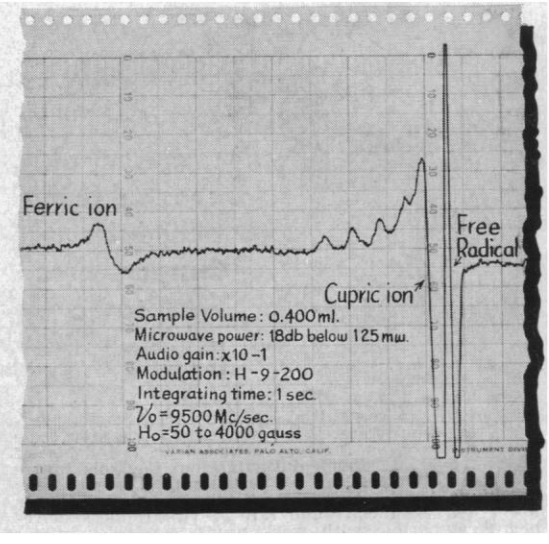
Number 10 of a series

FREE RADICAL AND PARAMAGNETIC ION KINETICS IN ENZYME-SUBSTRATE REACTIONS

INTERPRETATION: Metallic ions play important roles in many enzyme-substrate reactions; in others they enter only as impurities. EPR is a unique tool for monitoring and distinguishing paramagnetic ions and free radicals. As in the previous example, the following spectrum was obtained from fatty acyl CoA dehydrogenase acting upon 20 microliters of octanoyl CoA substrate. The sample was frozen at 77°K to separate the ferric, cupric and free radical signals appearing left to right on the spectrum. The hyperfine structure on the cupric ion spectrum is due to the interaction with the nuclear magnetic moments of Cu^{63} and Cu^{65}. The graph reveals that the cupric ion follows approximately the same kinetics as the free radical despite the fact that copper is considered to be an impurity in this reaction. It is to be noted also that there is more than one competing free radical reaction. What relation any of this information has with the fundamental process of interest in nature remains to be seen.

This data was furnished by courtesy of Dr. H. E. Beinert, Institute for Enzyme Research, University of Wisconsin.





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

VARIAN associates
INSTRUMENT DIVISION
PALO ALTO 18, CALIFORNIA