West Jefferson, Ohio, fifteen miles west of downtown Columbus.

Research Notes

The actual dissociation energy of the nitrogen molecule, an important number in many applications, has shown itself to be elusive. Spectroscopy yields several values, but cannot choose among them; other considerations, however, have narrowed the choice down to two values, 7.385 ev and 9.765 ev. In order to resolve the matter, J. M. Hendrie of Columbia University has made use of the large difference between the magnetic moments of N and N_2. Nitrogen gas was heated to 3450°K (at which temperature the oven burned out) and passed through an inhomogeneous magnetic field which could separate out the N component. At this temperature the nitrogen would be 20 percent dissociated if the dissociation energy is 7.385 ev but only 0.5 percent if it is 9.765 ev. The result: no dissociation at all. Taking into account noise in the apparatus, Hendrie concludes that the dissociation energy of N_2 must be greater than 8.80 ev, which implies that the 9.765 ev spectroscopic value is correct. The work is discussed in the September *Journal of Chemical Physics*.

Thirteen symposium papers presented at the fall meeting of the Society of Rheology last year have been published in the September *Journal of Applied Physics*. A wide range of topics is treated, ranging from the "Relaxation Time Spectrum of Dough" to "Rotation Plastometry Applied to Molten Polyethylene". One paper of interest is by Alfred M. Freudenthal of Columbia University, who investigated the effect of the rheological behavior of materials on thermal stress intensity. This is an important problem since "the conventional elastic analysis of thermal stress problems . . . results in design procedures for thermal stresses (in heat exchangers, nuclear reactors, flight structures at supersonic speeds, etc.) of considerable unreality." The findings: "a rough estimate of the intensity of the thermal stresses associated with various temperature cycles on the basis of a simple rheological model will provide a better estimate of the thermal stresses, and be a more reliable guide for design than an elaborate elastic analysis."

The radon content of the atmosphere seems to vary with the amount of general atmospheric contamination, thus contradicting the usual assumption that the radon originates directly from radioactive deposits in the ground. During the London smog of 1952, for example, 8×10^{-13} curie of radon per liter of air was found, a figure four hundred times larger than the corresponding one for a clear, sunny day. The present status of the radon problem is discussed in the September 4th issue of *Nature*, where it is suggested that smoke from the burning of large quantities of coal and coal gas may be the culprit. It is emphasized, however, that insufficient data has been obtained to establish the precise contribution of coal smoke to atmospheric radioactivity. The work, which forms part of a wider research in Great Britain into possible health hazards associated with prolonged exposure to small amounts of radioactive materials, is being extended in scope.

Gadgetry

The Zoomar Principle is the name given by F. G. Back and Herbert Lowen to the theory behind a system of lenses (The Zoomar) whose focal length can be varied continuously over wide limits without altering the position of the final image. Anyone able to afford both a Zoomar and a motion-picture camera can therefore change continuously from a wide-angle to a telephoto view of his subject. The Zoomar Principle, described in the September *Journal of the Optical Society of America*, is an equation giving the image deviation of the Zoomar system of lenses as a function of their relative position, or "zoom". The equation has three roots, corresponding to zoom positions giving zero deviation, and under the proper circumstances the deviation in the region between these positions is small enough to be negligible. Back and Lowen discuss their instrument in some detail, and refute the canard that it is merely a derivative of Gramatski's Fokator System.

A system for radiation monitoring by remote control in the vicinity of atomic explosions has been developed by the National Bureau of Standards. The system, which also can transmit weather information, consists of a number of self-contained transceivers operated from a control station. The control station can "ask" each data station for the desired information (say radiation intensity and wind velocity), there being a total of ten data channels available. To conserve the batteries each data station normally operates two seconds out of every twenty; when a query signal is received, the station transmits the required data as long as necessary before reverting to intermittent operation. The radio link is frequency modulated in the VHF band, which means line-of-sight transmission, and so repeater stations must be employed for long distances. The device was developed by L. Costrell, G. Minton, and E. R. Saunders of NBS at the request of the Division of Biology and Medicine of the AEC.

Self-luminous markers for military equipment and personnel that make use of strontium-90 are being adopted by the U. S. Navy, which has awarded a contract for 9000 such markers to Tracerlab, Inc. of Boston. This radioisotope has a half-life of 25 years, giving many years of useful life. The luminescence produced by strontium-90 can be as bright as 80 microlamberts, which is twice that of a sheet of white paper in full moonlight, and a variety of colors, with the exception of deep red, is available. These markers are superior to older versions containing radium, since the latter are more dangerous to personnel, can produce only a yellow-green glow, and are considerably fainter in intensity.