scattering in the various lead blocks show that a negligible portion of the 30 counts may be attributed to electrical scattering. It follows that the differential cross section for the non-electrical scattering of mesotrons of energies greater than 6×10^8 ev is of the order of 1×10^{-28} cm² per unit solid angle for the angular range 15°–35°.

H10. Determination of the Average β-Ray Energy in Artificial Radioactivity and Its Use in Radiation Dosimetry. L. D. MARINELLI, R. F. BRINCKERHOFF, *Memorial Hospital, New York,* AND E. H. QUIMBY, *College of Physicians and Surgeons, Columbia University.*—In many biological and medical studies where radioactive isotopes are used it is important to estimate rather closely the radiation dose delivered to living tissues by β-radiation. It has been shown[1] for β-ray isotopes that the dose is proportional to the average kinetic energy $\bar{E}$ of the β spectrum. $\bar{E}$, however, is infrequently stated in the literature. Values of $\bar{E}$ obtained from several β-ray spectra by direct graphical computation will be given. In addition it will be shown that once the energy limit, $E_{\max}$, of a spectrum is known (and in the case of complex spectra the relative proportions are given), $\bar{E}$ can be calculated satisfactorily (±6 percent) from the Fermi β-ray distribution function.

[1] L. D. Marinelli, Am. J. Roentgen. Rad. Therapy **47**, 210 (1942).

H11. A Convenient Dosage Unit for Radioactive Isotopes Internally Administered. G. FAILLA, *College of Physicians and Surgeons, New York.*—When irradiation equilibrium exists at a point in a mass of tissue, the rate of energy absorption is $3.7\times10^{10}qV$ ev/sec./gram, q being the concentration of isotope in the tissue in curies per gram and V the average energy per disintegration in ev. By incorporating the isotope in the "walls" of an ionization chamber, suitably constructed, it is possible to determine this quantity without knowing q and V. Since this quantity forms the basis of all biological dosage, it is convenient to express it in *roentgen-curies*. One roentgen-curie then represents the amount of any radioactive isotope that emits energy at the rate of 5.35×10^{13} ev/sec. (this being the amount of energy released by one roentgen in one gram of air). Since q and V (especially V) are difficult to measure accurately, the practical advantages of the scheme are obvious. For a given isotope, measurements of this type need be made only once. Thereafter ordinary methods suffice.

H12. A Radium Source Ion Gauge. G. L. MELLEN, *National Research Corporation* (Introduced by R. L. McCreary).—An ion gauge using a radioactive source is described. Constructional details are given and a brief coverage is made of the d.c. amplifier circuits associated with the gauge. Designed to measure pressures between one micron and ten millimeters, the gauge is not harmed by exposure to any pressure. Ionization is produced by the alpha-particles from a small "source" plaque containing approximately 200 micrograms of radium. The active deposit is a gold-radium alloy bonded to a silver backing and is only a few microns in thickness so that it is a highly efficient alpha-emitter. Since ionization is the mode of pressure measurement, the gauge response is a linear function of pressure throughout its operating range. Extension of the range allows for calibration at any higher pressures. By suitable choice of gauge constants, a measuring device may be made for any pressure interval. Of rugged mechanical construction, this gauge has found immediate use in the high vacuum field.

FRIDAY AFTERNOON AT 2:15

M.I.T., Room 6–120

(W. P. ALLIS presiding)

J1. A Pulsed Mass Spectrometer with Time Dispersion. W. E. STEPHENS, *University of Pennsylvania.*—Advances in electronics seem to make practical a type of mass spectrometer in which microsecond pulses of ions are selected every millisecond from an ordinary low voltage ion source. In travelling down the vacuum tube, ions of different M/e have different velocities and consequently separate into groups spread out in space. If the ions are collected in a fixed Faraday cage and the current amplified, then pulses of current corresponding to different ion M/e will be dispersed in time. If the amplified current pulses are put on the vertical plates of an oscillograph whose sweep is synchronized with the pulses, then an M/e spectrum of the ions will be exhibited. This type of mass spectrometer should offer many advantages over present types. The response time should be limited only by the repetition rate (milliseconds). The indication would be continuous and visual and easily photographed. Magnets and stabilization equipment would be eliminated. Resolution would not be limited by smallness of slits or alignment. Such a mass spectrometer should be well suited for gas composition control, rapid analysis, and portable use. A mass spectrometer of this type is being constructed.

J2. The Ionization Potential of CH_2. A. LANGER AND J. A. HIPPLE, *Westinghouse Research Laboratories, East Pittsburgh, Pennsylvania.*—The free radical, CH_2, was produced in the ionization region of a mass spectrometer by the thermal decomposition of diazomethane. The arrangement was similar to that used previously[1] in the measurements of the ionization potentials of CH_3 and C_2H_5 from the decomposition of $Pb(CH_3)_4$ and $Pb(C_2H_5)_4$.