Measurements, by this method, on the number of β-particles transmitted and reflected by thin foils of aluminum and of tin were made, using for the source radium E and thorium active deposit. The results show that the number of β-particles transmitted decreases more rapidly than if the exponential law held as it does hold in measurements of absorption by the ionization method. In the reflection experiments, the ratio of the number of reflected β-particles to the number incident was found smaller than the ratio of the ionization of the reflected rays to the ionization of the incident rays, as found by Schmidt and one of us.[1] In both classes of experiments, the absorbing or reflecting material was close to the source of rays and at some distance from the counting chamber.

The figure shows that the logarithmic curves deviate from the straight lines to be expected from the exponential law. The increase of ionizing power with the decrease of velocity of the β-particles, due to passage through matter, doubtless explains the effects observed.

The comparatively small number of β-particles counted in these experiments (60,000) makes it undesirable at present to state the results quantitatively.

Discharges from the point due to γ-radiation were small in number under the conditions of the experiments, but were always measured and corrected for.

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ABSORPTION OF β-PARTICLES BY GASES.[2]

BY ALOIS F. KOVARIK.

THE preliminary work on the absorption of β-particles, namely from radium D and radium E, was reported at a previous meeting of this society. The principle of the method used in the investigation is to allow the particles to pass through a definite distance in the gas before entering a shallow ionization chamber (2 or 3 mm. deep). By increasing the pressure of the gas, the absorption becomes greater, but the ionization in the ionization chamber also becomes greater. If the pressure is within twenty atmospheres the ionization is proportional to the pressure. All measurements were made within this pressure. Consequently, the ionization reading is reduced to what it would be at one atmosphere. The mean path of the β-particles is found graphically. By changing the pressure the absorption curve is obtained. The values obtained for the coefficient of absorption for different distances of the active material from the ionization chamber were concordant when the metallic pressure apparatus was lined with thick paper, thus minimizing the reflected radiation effect. This also shows that the graphical method of finding the mean path of the β-particles is feasible. The measuring instrument was C. T.

[1] Schmidt, Ann. d. Phys., XXIII., 671, 1907; Kovarik, Phil. Mag., XX., 849, 1910.

[2] Abstract of a paper presented before the American Physical Society at Atlanta, December 31, 1913.

R. Wilson's inclined electroscope in some experiments, ordinary Dolezalek electrometer and Erikson's modification of Dolezalek's electrometer. The rate method and Townsend's null method were both used in taking readings, the null method being found the more satisfactory.

The radiations examined are those from radium D, radium E, uranium X, actinium active deposit, thorium active deposit. The soft radiation was studied by obtaining the differential curve and it was found rather difficult to obtain accurate results.

The results are given in the table below for the two gases used, air and carbon dioxide.

Substance.	Coefficient of Absorption in— Air.	Carbon Dioxide.
Radium E	0.0151 cm.	0.0298 cm.
Radium D (hard)	0.086	0.157
Radium D (soft)	0.64	1.48
Uranium X (hard)	0.0063	0.0116
Uranium X (soft)	0.12	0.24
Actinium Active Deposit (hard)	0.0091	0.0175
Actinium Active (Deposit (soft)	0.35	
Thorium Active Deposit (hard)	0.00683	0.01293
Thorium Active Deposit (soft)	0.09	0.14

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The Mobility of Ions at Different Temperatures and Constant Gas Density.[1]

By Henry A. Erikson.

The mobility of ions at different temperatures and at constant pressure was determined by Kovarik and by Phillips. The agreement in their results is quite close. The writer has felt that a determination of the mobility at constant gas density ought, however, to be made as the conditions to which the ions are subject at the lower temperatures at least are not necessarily the same in this case as in the case of constant pressure.

The α rays from polonium were used as the ionizing agent. The ions were drawn towards a wire grating through which some of them passed and became subject to an alternating field. The time required to charge the electrometer to a given potential was measured. The reciprocal of this time, *i. e.*, the current is proportional to the frequency. By using various values for the frequency and plotting, the frequency (n) necessary to give no current is obtained and the mobility calculated from the relation

$$k = \frac{4d^2n}{v},$$

where d is the distance from the grating to the plate connected to the electrometer and v the difference of potential.

[1] Abstract of a paper presented at Atlanta meeting of Physical Society, December, 1914.