Po α RANGES IN VARIOUS COUNTING MIXTURES*

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By

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In order to adjust pressures correctly in proportional counters and ionization chambers that employ Po α sources for standardization, we have measured the range relative to air in a number of common fillings. The range ratios were obtained from a gas cell of fixed dimensions and variable pressure. The source (prepared by D. Vier and associates) was deposited on a silver button. Approximately 15.2 cm from the source was a ZnS detector (17.5 mg/cm² RCA # 33Z20A) deposited on the face of an aluminized lucite light pipe which transmitted the scintillator radiation to a 5819 photomultiplier tube. Integral range curves at 20° C were obtained by varying the pressure (measured on a $\frac{1}{2}$ % gauge) in the cell and counting the α signals above a certain low threshold. After taking the range curve for a particular mixture an air curve was run. The air was dried over P₂O₅, all other gases were spectroscopic except CO₂ which was a commercial grade. For the purpose of calculating ratios, the mean range was associated with the point of steepest tangency on the integral range curve. In the air curves the extreme fluctuation of this point from the mean of 8 runs was less than 1%. In figure I we illustrate, for example, the family of A + CO₂ curves. In table I we give the gas mixtures and their range ratios. Some computed values⁽¹⁾

(1) M. S. Livingston and H. A. Bethe "Rev. Mod. Phy. 9, 275 (1937)

are given in parentheses. We estimate the ratios to have an error of approximately 2%. References to other measurements of some of these values may be found in loco citato.

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For The Atomic Energy Commission

William D. Stevenson

Chief, Declassification Branch *L*

CAPTIONS

Figure I

Integral range curves for the A + CO₂
family of counting mixtures.

MIXTURE	RANGE RATIO
H ₂	4.532 (4.570)
He	5.629
N ₂	1.016
A	1.088
A + 1 $\frac{1}{2}$ % CO ₂	1.057
A + 10% CO ₂	0.9338
CO ₂	0.6722
CH ₄	1.117 (1.111)
P ₁₀ *	1.086
Kr	0.7650
Kr + 1 $\frac{1}{2}$ % CO ₂	0.7592

TABLE I

Ratio of Po α ranges in various mixtures
to the range in air.

*Commercial mixture, 90% Argon - 10% methane,
obtained from The Matheson Co., Inc.
East Rutheford, New Jersey

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