

(9.4) A  $^{244}\text{Cm}$  sample is measured in an ion chamber (Fig. 9.9). The voltage drop over a  $3 \cdot 10^{13} \Omega$  resistor is measured to be 0.47 V. What is the activity of the sample if all  $\alpha$ 's emitted in the chamber ( $2\pi$  geometry) are stopped in the gas?

General constants:

$$eV := 1.6021773 \cdot 10^{-19} \cdot \text{joule} \quad Bq := \text{sec}^{-1} \quad q_e := 1.6021773 \cdot 10^{-19} \cdot \text{coul}$$

Given values are:

$$E_{\alpha} := 5.8 \cdot 10^6 \cdot eV \quad R := 3 \cdot 10^{13} \cdot \Omega \quad U := 0.47 \cdot \text{volt}$$

$$\eta := 1 \quad \psi_{geom} := 0.5 \quad 2\text{-}\pi \text{ geometry}$$

$$I := \frac{U}{R} \quad \text{The current giving the measured voltage drop}$$

$$w := 26 \cdot eV \quad \text{eV/ion pair in air (from Table 8.1)}$$

$$A := \frac{I \cdot w}{q_e \cdot E_{\alpha} \cdot \eta \cdot \psi_{geom}} \quad A = 0.877 \cdot Bq$$