

## EN-04 Geiger Tube

This end-window halogen Geiger tube has a stainless steel outer shell and a BNC connector at the end of the case. The window covers the end of the cylinder. It is connected to the Geiger Counter using an EN-11 Connecting Cable. The Geiger tube will respond to alpha ( $\alpha$ ), beta ( $\beta$ ), and gamma ( $\gamma$ ) radiation and operates at 900 V. The window has a density of 1.8-2 mg/cm<sup>2</sup> so that readings from low energy sources are possible. The end window is mica and is 3cm in diameter. The dead time, i.e., the time required for the tube to deionize and become sensitive again is  $200 \cdot s$ . This figure is only important for very high count rates from strong sources, which are not likely to be encountered in the student laboratory.

### Operation

1. Remove the Geiger tube from its package. The Geiger tube has a cap fitted over its end window to avoid damage to the delicate membrane. This is removed before use and must be replaced at the end of the measurements.

Do not touch the end window of the Geiger tube. The window is fragile and cannot be repaired. If it breaks the entire unit must be replaced.

2. Attach the EN-11 Connecting Cable to the BNC connector and assemble the tube in the apparatus with the radioactive source and absorbers. The tube is sensitive to  $\alpha$ ,  $\beta$  and  $\gamma$  sources.

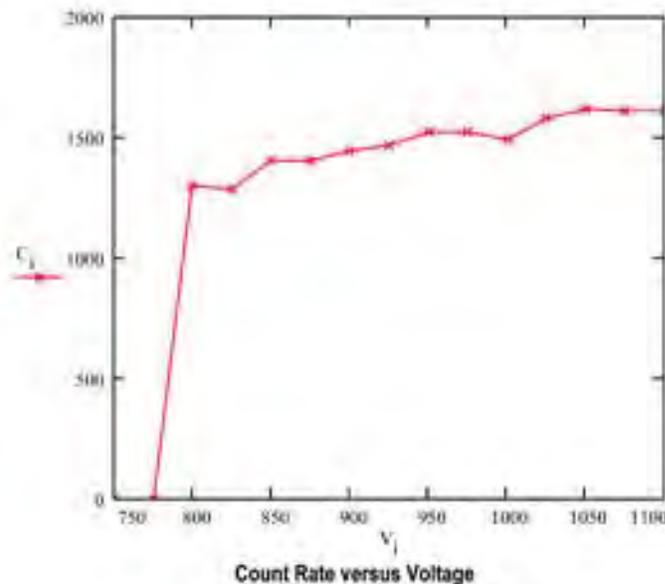
3. Turn off the Geiger Counter then select the correct voltage. The EN-15 Geiger Counter has two voltage outputs, 450V and 900V. Select 900V, and connect the cable from the Geiger tube to the input jacks. Observe the correct polarity. The EN-30 Geiger Counter has a continuously adjustable supply voltage. Turn the "Voltage Adjust" to its extreme counter-clockwise position. Connect the Geiger tube to the input jacks on the rear panel.

4. Turn on the Geiger Counter. The EN-15 is ready to count and will likely show some background count even if there is no source near it. The EN-30 needs to have the tube voltage set. To do this press the "Mode" switch until the instrument is in the Voltage Mode, so that the display shows the tube voltage. Turn the "Voltage Adjust" until the display indicates 900 V. Press the "Mode" switch to one of the counting modes.

5. Reset the counter. The Geiger tube is now active and should show random counts due to natural radioactivity.

All Geiger tubes are slightly sensitive to their operating voltage. They have a wide region (the plateau) where the measured count rate is nearly independent of voltage. Below this region the sensitivity falls off very rapidly, while above this region the tube begins to break down spontaneously. In this excessive voltage region, the count rate is very high and erratic. Excessive voltage should be avoided because the count is unreliable and the tube is in danger of permanent damage.

The voltage characteristics of the EN-04 Geiger Tube are shown in the following graph. The manufacturer's voltage rating for this tube is 900V, but the data shows that it will operate satisfactorily from 850 to 1000V. Most Geiger Counters do not supply more than 1200V, which is too high for reproducible readings, but is not high enough to damage the tube.



**Specifications**

Type End window halogen quenched  $\alpha$ ,  $\beta$  and  $\gamma$  counter tube.

Window Thickness 1.8-2 mg/cm<sup>2</sup> Material: Mica

Window Diameter 3 cm

Operating Voltage 850-1000 Vdc

Plateau Slope 10%/100 V

**Limiting Values**

Anode Resistor 4.7megohms Minimum

Anode Voltage 1200Vdc Maximum

Dimension 3.5 cm x 12 cm

Connector BNC jack connects