

Image of ISS Tissue Equivalent Proportional Counter

The TEPC is designed to measure the dose that a small volume of tissue would receive from a wide variety of radiation sources. It simulates a $2\mu\text{m}$ diameter volume of tissue using a cylindrical detector design. The detector volume is 2 inches in diameter and 2 inches long, and is filled with a very low pressure of propane gas. The gas volume is surrounded by tissue equivalent plastic. The organic molecules in the plastic and gas effectively simulate the cell wall and cell body respectively.

When radiation interacts with the detector, electrons are produced and accelerated towards a small wire in the middle of the detector that is held at a high positive voltage. As the electrons accelerate towards the wire, other electrons are created, and an amplification of the initial event occurs. The electrons are collected by the wire and a signal pulse is generated that is proportional to the energy of the radiation that hit the detector. The signal pulses are then amplified and stored in memory in the spectrometer portion of the instrument until they are downloaded to the ground for detailed analysis.