

EJ-410 FAST NEUTRON DETECTOR

The EJ-410 detector is specifically designed for detecting fast neutrons while being nearly insensitive to gamma radiation. This detector is an improvement over the original EJ-400 from research in 2001 which increased the neutron efficiency by 70% at 2 MeV and similarly at other energies. The detector consists of zinc sulfide phosphor embedded in a plastic matrix structured in a series of concentric cylinders of clear plastic to facilitate light collection. Proton recoil interactions in the strongly hydrogenous polymer materials provide the protons being detected by the phosphor. Electrons scattered in the detector by gamma interactions interact very weakly with the ZnS:Ag particles providing scintillation pulses easily eliminated from the counting systems by setting an appropriate threshold.

The Fast Neutron Detector is an inert plastic disc 15.9 mm thick (0.625") which can mount to a photomultiplier either directly or by means of a suitable light guide. Optical greases, silicone rubbers or epoxies may be used with the EJ-410. A variety of blue-sensitive phototubes may be used.

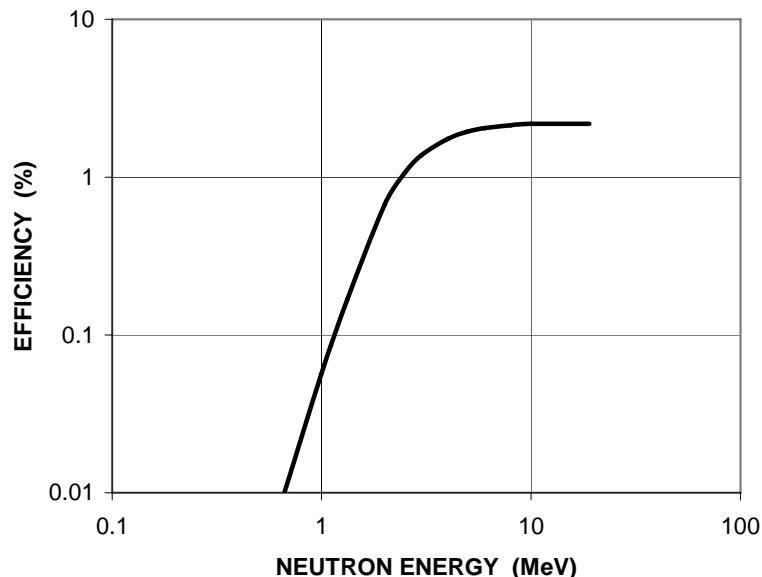
Gamma Discrimination

Gamma scintillation pulses are usually smaller than those generated by neutrons. In gamma fields below 1R/hr. pulse height discrimination can easily be used to reject the gamma pulses. The randomly generated recoil protons will, however, generate a broad scintillation pulse height spectrum. Hence, in high gamma fields, the simultaneous detection of multiple gammas can generate pulse heights large enough to be in the normal neutron spectrum. The consequent higher discriminator settings needed will then reduce the neutron detection efficiency. Additional gamma rejection may be achieved by using time constants of a few microseconds.

Wavelength of maximum emission 450 nm
Scintillation decay constant 0.2 microseconds
Maximum operating temperature..... 90°C

Standard Sizes: 10mm, 25mm, 38mm, 50mm, 76mm and 125mm diameter.

EJ-410 NEUTRON DETECTION EFFICIENCY
50 mm Dia. Detector



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