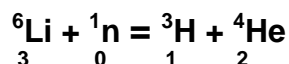


EJ-422 THERMAL NEUTRON DETECTOR SHEET

The EJ-422 is an efficient detector of thermal neutrons in the presence of gamma radiation. The detector employs a lithium compound, whose Li content is enriched to 95% ${}^6\text{Li}$ dispersed in a ZnS (Ag) matrix. It is a flat white plastic sheet with 0.7mm thickness and is manufactured as a free standing sheet. As the product EJ-422A it is supplied cemented to a supporting aluminum plate of 1mm thickness. Efficient measurements of thermal neutron fluxes may be performed in the presence of gamma radiation as high as 10^7 gamma rays per neutron.

The efficiency is dependent on the neutron energy and is approximately 11% for 0.1 eV neutrons and 30% for neutrons of energy 0.01 eV or less. The detection efficiency for thermal neutrons of about 0.025 eV is approximately 21%. The attainable detection efficiency in a particular application will, of course, also depend on the competing gamma ray background.

The detection process in EJ-420 depends on the nuclear reaction ${}^6\text{Li} (n, \alpha) {}^3\text{H}$:



with a cross section of 910 barns for 0.025 eV neutrons. The resulting triton and alpha particle are efficiently detected in a ZnS (Ag) phosphor especially selected for short decay time characteristics.

For typical applications EJ-422 is optically bonded to the photomultiplier or suitable light guide with clear silicone grease. The detection efficiencies obtained would be dependent on the efficiency of optical coupling to the photomultiplier. EJ-422 may be surrounded by an appropriate quantity of hydrogenous material for neutron thermalization. The neutron flux is determined above a desired rejection ratio of gamma radiation or photomultiplier noise by setting the pulse height analyzer or discriminator of the associated electrical equipment to an appropriate level. This is adequate for most applications, but if the flux of gamma rays is very high, pulse shape discrimination may be effectively used.

Lithium-6 content: 2.5 mg of ${}^6\text{Li}$ per cm^2
Pulse Height: 120% NaI(Tl)
Wavelength of maximum emission 450 nm
Decay Time (principal short component):..... 0.2×10^{-6} sec.

Standard Sizes: Sheets and discs up to 20cm diameter or square are available.



ELJEN TECHNOLOGY
2010 East Broadway
Sweetwater TX 79556 USA

Tel: (325) 235-4276 or (888) 800-8771
Fax: (325) 235-0701
Website: www.eljentechnology.com