

# LEAD LOADED PLASTIC SCINTILLATOR

## EJ-256

EJ-256 is a homogeneous, clear plastic scintillator in which lead has been incorporated by means of organometallic chemistry. Typical lead loading ranges from 1% to 5% by weight. Loadings up to 10% have been made but are not recommended. With increasing lead loading, there are corresponding losses in scintillation efficiency and optical clarity of the final plastic.

EJ-256 is best used for gamma detection at energies below 100 keV where there is a significant impact of the lead on attenuation coefficients. This is most strongly evident at 60 keV and lower

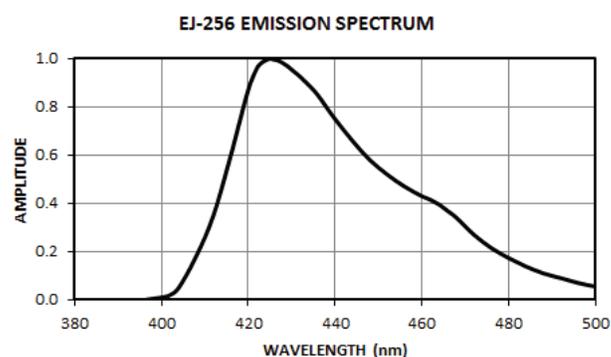
where the photoelectric cross section is notably enhanced. At these energies, signal amplitudes from EJ-256 are commonly greater than those from an intrinsically brighter plastic scintillator that has no loading with heavy atoms as a result of the photoelectric contribution in the detection process. Detection efficiencies are also notably increased.

EJ-256 is also excellent for dosimetric detection applications. Lead concentrations in the 1-2% range impart a flatness in response down to at least 20 keV.

PROPERTIES	EJ-256 (% lead)	
	5%	1.5%
Light Output (% Anthracene)	34	50
Scintillation Efficiency (photons/1 MeV e <sup>-</sup> )	5,200	7,700
Wavelength of Maximum Emission (nm)	425	425
Decay Time (ns)	2.1	2.1
H Atoms per cm <sup>3</sup> (×10 <sup>22</sup> )	5.20	5.21
C Atoms per cm <sup>3</sup> (×10 <sup>22</sup> )	4.62	4.68
Electrons per cm <sup>3</sup> (×10 <sup>23</sup> )	3.48	3.39
Density (g/cm <sup>3</sup> )	1.081	1.037



Polymer Base	Polyvinyltoluene
Refractive Index	1.58
Softening Point	75°C
Vapor Pressure	Vacuum-compatible
Coefficient of Linear Expansion	7.8 × 10 <sup>-5</sup> below 67°C
Temperature Range	-20°C to 60°C
Light Output (L.O.) vs. Temperature	At 60°C, L.O. = 95% of that at 20°C No change from -60°C to 20°C



### CHEMICAL COMPATIBILITY

Attacked By: Aromatic solvents, Chlorinated solvents, Ketones, Solvent bonding cements, etc.

Stable In: Water, Dilute acids and alkalis, Lower alcohols, Silicone greases.

It is safe to use most epoxies with this scintillator.

Revision Date: Jul 2021



### ELJEN TECHNOLOGY

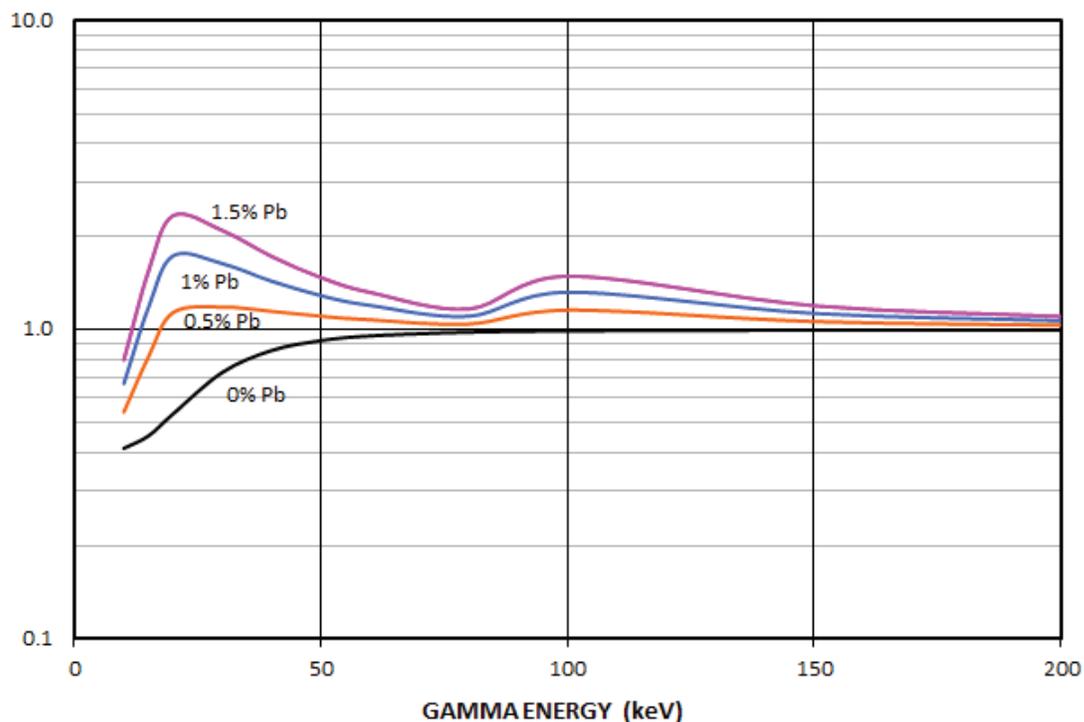
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### GAMMA ATTENUATION OF EJ-256 LEAD-LOADED PLASTIC SCINTILLATORS COMPARED TO WATER RATIO OF LINEAR ATTENUATION COEFFICIENTS



PHYSICAL CONSTANTS						
% Lead	5%	2%	1.5%	1%	0.5%	0%
L.O. (% Anthracene)	34	47	50	53	56	65
S.E. (photons/1 MeV e <sup>-</sup> )	5,200	7,300	7,700	8,100	8,600	10,000
Density (g/cm <sup>3</sup> )	1.081	1.043	1.037	1.033	1.028	1.023

LINEAR ATTENUATION COEFFICIENTS ( $\mu_L$ )						
keV	5%	2%	1.5%	1%	0.5%	0%
10	8.95	4.75	4.07	3.41	2.76	2.10
15	6.56	2.96	2.38	1.82	1.26	0.70
20	4.93	2.14	2.69	1.25	0.820	0.385
30	1.80	0.843	0.688	0.538	0.389	0.239
40	0.932	0.485	0.413	0.344	0.275	0.205
50	0.591	0.345	0.306	0.267	0.229	0.191
60	0.428	0.277	0.253	0.230	0.207	0.183
80	0.287	0.216	0.205	0.194	0.183	0.172
100	0.452	0.275	0.246	0.219	0.191	0.164
150	0.251	0.187	0.177	0.167	0.157	0.147
200	0.186	0.155	0.150	0.145	0.140	0.135
600	0.096	0.092	0.091	0.090	0.090	0.085
660	0.0914	0.0876	0.0870	0.0865	0.0860	0.0855
1250	0.0664	0.0642	0.0638	0.0636	0.0633	0.0630