



Due to low effective atomic number organic materials are characterized by negligible back scattering effect for the process of charged particles absorption. Due to high concentration of hydrogen atoms they are used in fast neutron spectroscopy. Scintillators on the base of organic crystals are non-hygroscopic and fast.

Anthracene (C₁₄H₁₀)

Traditional organic scintillator finds use in a number of special applications.

Stilbene(C₁₄H₁₂)

Used for selective registration of fast neutrons (n) on the γ -radiation background in scintillation pulse-shape discrimination techniques, as well as for α/β -, v/β -, proton/ β -selection. It makes possible to perform neutron field spectrometry.

Doped crystals of p-terphenyl (C₁₈H₁₄)

Doped p-terphenyl crystals retain all basic advantages of organic scintillators, i.e. short decay time ($\tau \gg 3-4$ ns), temperature-independent light output values in a wide temperature range (-80...+150 °C).

Scintillators based on doped p-terphenyl crystals are used in β -radiation spectrometry, where they are the most effective organic scintillators, α -radiation one, as well as for fast neutrons detection on the γ -radiation background in schemes for radiation discrimination by the scintillation pulse shape. Due to short decay time, p-terphenyl can be used in the spectrometry of high-intensity radiation.

Material	Important properties	Application comments
Anthracene	High light output anisotropy	β -radiation spectrometry
Stilbene	Selection of fast neutron on the γ -radiation background	Fast neutron spectroscopy n/γ , α/β -discrimination
Doped p-terphenil	High light yield.	α -, β -radiations spectroscopy

Selector guide for organic single crystal scintillators.



ORGANIC SCINTILLATORS



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	Anthracene (C₁₄H₁₀)	Stilbene (C₁₄H₁₂)	p-terphenyl (C₁₈H₁₄)
Molecular weight	178	180	230
Density, g cm⁻³	1.25	1.22	1.23
H/C - ratio	0.714	0.857	0.778
Melting point, °C	216	124	214
Emission peak λ_m, nm	445	390	420
Refractive index at λ_m	1.62	1.64	1.65
Light output, 10⁴ photons/MeV	2,0	1,4	2,7
Decay time, ns	30	3.5	3.7
A ratio of ranges in the crystal and anthracene for:			
a) heavy charged particles	1	1.002	0.997
b) electrons	1	1.014	1.012
Radiation degradation (Mrad)	2	4,0	4.5