BC-501/BC-501A/BC-519 Liquid Scintillators

BC-501, BC-501A and BC-519 are all premium liquid scintillators intended for applications involving neutron detection in the presence of gamma radiation.

BC-501A is the most popular and is formulated to yield excellent PSD properties for neutron-gamma discrimination (Ref. 1). SGCD most often supplies BC-501A encapsulated in metal or glass cells ready for immediate use. The most common cells are the bubble-free type MAB-1 cell or the type MVB-1 cell which has a bubble in it. Both are made of aluminum and can be provided complete with photomultipliers and voltage dividers appropriate for PSD work.

BC-501A is also supplied in bottles, deoxygenated and sealed under inert nitrogen gas. When the liquid is transferred to the user's cell, it must be newly deoxygenated, usually by purging with pure nitrogen or argon gas for at least 15 minutes immediately before sealing the cell, in order to assure good PSD performance.

BC-519 is mineral-oil based and also exhibits excellent PSD properties. This liquid is mainly intended for use in large volumes and is therefore formulated to have an especially high flash point for safety purposes. It is available in 5 gallon (19 liter) and 25 gallon (95 liter) quantities.

General Technical Data –

Density:

BC-501A.....0.874g/cc
BC-501.....0.901g/cc
BC-519.....0.875g/cc

Refractive Index, n_D:

BC-501A.....1.505

Refractive Index at 425nm:

BC-501A.....1.530
BC-501.....1.538
BC-519.....1.50

Flash Point, T.O.C.:

BC-501A.....24°C
BC-501.....47°C
BC-519.....74°C

	BC-501A	BC-501	BC-519
Scintillation Properties –			
Light Output, %Anthracene	78	80	60
Wavelength of Maximum Emission. nm	425	425	425
Decay Time, short component, ns	3.2	3.3	4.0
Atomic Composition –			
No. of H Atoms per cc ($x10^{22}$)	4.82	5.25	6.62
No. of C Atoms per cc ($x10^{22}$)	3.98	4.08	3.83
Ratio H:C Atoms	1.212	1.287	1.728
No. of electrons per cc ($x10^{23}$)	2.87	2.97	2.96

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Scintillation Products
Organic Scintillators

SAINT-GOBAIN
CRYSTALS

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BC-501/BC-501A/BC-519
Liquid Scintillators

Additional Properties of BC-501A–

Mean Decay Times of first three components (Ref. 2).....3.16, 32.3 & 270ns

Mean Life Time for energy transfer from solvent to to solute (Ref. 2). ns 1.66

No. of photoelectrons/keV energy loss using Burle 8575 phototube (Ref. 2) 1.7

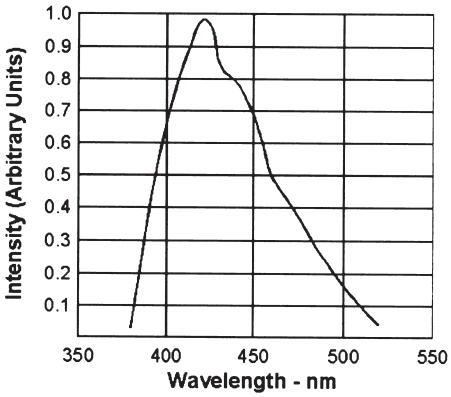
Ratio, Alpha:Beta, "fast" (Ref. 3).....0.073

Ratio, Alpha:Beta, "slow" (Ref. 3) 0.098

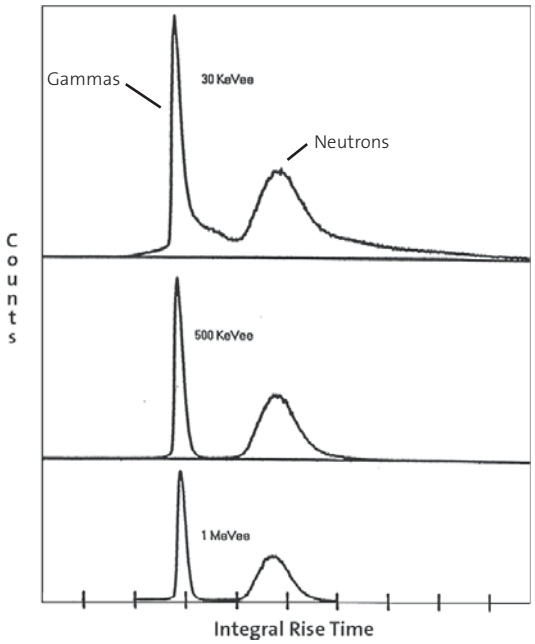
Response to protons: $E = 0.83P - 2.82\,[1-\exp(-0.25P^{0.93})]$ where P is the proton energy in MeV, and E is the electron energy in MeV that gives the same light output (Ref. 4).

Fig. 25 of Ref. 5 indicates the light output vs. inital kinetic energy of protons.

Emission Spectrum of BC-501A –



PSD Performance of BC-501A Effect of Energy Threshold –



References –

1. "Comparison of the Scintillators BC-501 and NE213", C.A. Goulding et al, LANL Technical Note LA-N2TN-87-201, April 1987.
2. "Time-Dependence of Scintillators and the Effect on P.S.D.", F.T. Kuchnir & F.J. Lynch, *IEEE Trans. Nucl. Sci.,* NS-15, No. 3, 107-113 (1968)
3. "The Alpha/Beta Ratio of Several Organic Scintillators", J.B.Czirr, *Nucl. Instr. & Meth.*, 25, 106-108 (1963).
4. "Improved Predictions of Neutron Detection Efficiency for Hydrocarbon Scintillators from 1MeV to about 300MeV", R.A. Cecil et al, *Nucl. Instr. & Meth.*, 161, 439-447 (1979).
5. R. Katz et al, *Nucl Instr. & Meth.*, 100, 13-32 (1972).

Manufacturer reserves the right to alter specifications.

(12-09)