

## EJ-339 and EJ-339A BORON LOADED LIQUID SCINTILLATOR

Two standard versions of this boron-loaded liquid are offered. EJ-339 contains 5% by weight of natural boron and, hence, contains approximately 1%  $^{10}\text{B}$ . In EJ-339A the same boron loading compound is enriched to 90% atom percent in  $^{10}\text{B}$  and therefore contains 4.6%  $^{10}\text{B}$  by weight. Other boron loadings are also available.

These scintillators are used for total absorption neutron spectrometry in which the prompt recoil proton pulse from an incoming fast neutron is gated by the boron capture pulse of the same neutron having been thermalized within the scintillator. The  $^{10}\text{B}(n,\alpha)^7\text{Li}^*$  dominant capture reaction has a 2.31MeV Q-value which produces a scintillation pulse of amplitude equivalent to that of an electron of about 90keV. A combination of pulse height and pulse shape discrimination techniques may be employed to identify the prompt and delayed neutron pulses from amongst the gamma background. For neutron energies below 200keV, the capture time constant is solely determined by the  $^{10}\text{B}$  concentration and is inversely proportional to it. The average capture time is about 1.4  $\mu\text{sec}$  for EJ-339 and 0.3  $\mu\text{sec}$  for EJ-339A. The average time to thermalize and capture a 1MeV neutron is 2.7  $\mu\text{sec}$  for EJ-339 and would be proportionally smaller for EJ-339A.

These liquids can be supplied sealed in metal or glass cells of a variety of designs to meet your research needs. In order to achieve good neutron capture efficiencies, very small cells or thin cells should be avoided. The liquids are also available in bulk. The liquids are moisture sensitive and must be carefully handled to avoid even the moisture found in air. Also, to assure good pulse shape discrimination properties, the liquids must be encapsulated under appropriate inert gas conditions.

### PROPERTIES

$^{10}\text{B}$ Content, weight percent .....	See Table Below
Density, g/cc ( 20°C).....	0.92
Light Output, (% anthracene) .....	65%
No. of Blue Photons per 1 MeV electron .....	10,000
Wavelength of Maximum Emission .....	425nm
Decay Time, short component.....	3.7 ns
Refractive Index .....	1.415
Flash Point .....	16°F (-8°C)

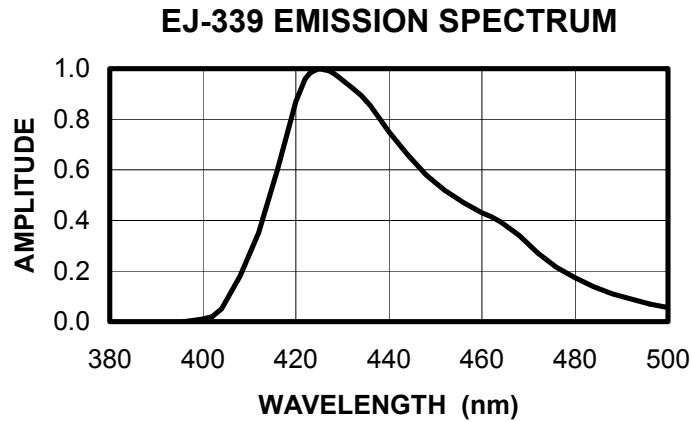
### Atomic Composition, atoms/cc x 10<sup>22</sup>

	<u>EJ-399</u>	<u>EJ-399A</u>	<u>EJ-399A2</u>
$^{10}\text{B}$ weight	0.95%	4.6%	2.5%
Boron-10	0.053	0.254	0.137
Carbon	2.90	2.87	3.43
Hydrogen	5.03	4.98	5.10
Oxygen	0.814	0.802	0.432



**ELJEN TECHNOLOGY**  
PO Box 870, 300 Crane Street  
Sweetwater TX 79556 USA

Tel: (325) 235-4276 or (888) 800-8771  
Fax: (325) 235-2872  
Website: [www.eljentechnology.com](http://www.eljentechnology.com)



### References

1. L.W. Bollinger and G.E. Thomas, Rev. Sci. Instrum., 28, 489-496 (1957)
2. L. Von Sutterlin, Atomkernenergie, Vol. 12, No. 7/8, 287-8 (1967)
3. L.R. Greenwood and N.R. Chellew, Rev. Sci. Instrum., 50 (4), 466-471, (April, 1979)
4. D.M. Drake, et al, Nucl. Instrum. & Methods in Phys. Res., A274, 576-582 (1986)



**ELJEN TECHNOLOGY**  
PO Box 870, 300 Crane Street  
Sweetwater TX 79556 USA

Tel: (325) 235-4276 or (888) 800-8771  
Fax: (325) 235-2872  
Website: [www.eljentechnology.com](http://www.eljentechnology.com)