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<tr>
<th>SCINTILLATOR</th>
<th>RELATIVE LIGHT OUTPUT (CTB 100)</th>
<th>BETA H / C AVGS</th>
<th>INTERNAL COUNTING</th>
<th>SCINTILATES</th>
<th>GAMMA RAY SENSITIVITY</th>
<th>FAST NEUTRON SENSITIVITY</th>
<th>THERMAL NEUTRON SENSITIVITY</th>
<th>RUSSELL-SAFMAN DISCRIMINATION</th>
<th>LARGE VOLUME FLASHERS</th>
<th>HIGH FRACTION ON ACQUISITION</th>
<th>NON-LINEARITY</th>
<th>COMMENTS</th>
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<tr>
<td>NE 211</td>
<td>78</td>
<td>2.6</td>
<td>1.248</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td></td>
<td>37</td>
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<tr>
<td>NE 213</td>
<td>78</td>
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<td>1.213</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>many</td>
<td>Internal Counting: excellent P.S.D. properties</td>
<td></td>
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<tr>
<td>NE 216</td>
<td>78</td>
<td>1.171</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<td>Premium scintillator for internal counting</td>
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<tr>
<td>NE 218</td>
<td>70</td>
<td>3.9</td>
<td>1.28</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>162, 216</td>
<td>Excellent P.S.D. properties</td>
<td></td>
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<tr>
<td>NE 218A</td>
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<td>1.37</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>Large tanks</td>
<td></td>
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<tr>
<td>NE 220</td>
<td>65</td>
<td>3.8</td>
<td>1.669</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>179</td>
<td>For aqueous samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE 221</td>
<td>55</td>
<td>1.669</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>196 etc.</td>
<td>GEL scintillator for insoluble samples and suspensions</td>
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<tr>
<td>NE 223</td>
<td>58</td>
<td>7.1</td>
<td>1.678</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>28</td>
<td>Docolin based</td>
<td></td>
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<tr>
<td>NE 224</td>
<td>80</td>
<td>2.7</td>
<td>1.330</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>203, 217</td>
<td>Inexpensive; high light output and transmission</td>
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<tr>
<td>NE 226</td>
<td>20</td>
<td>3.3</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>(F) 56, 184</td>
<td></td>
<td>Inexpensive to neutrons; negligible H content</td>
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<tr>
<td>NE 228</td>
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<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>(H)</td>
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<td></td>
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<tr>
<td>NE 230</td>
<td>60</td>
<td>3.0</td>
<td>0.984</td>
<td>x</td>
<td>x</td>
<td>(H) 5</td>
<td></td>
<td></td>
<td></td>
<td>Deterated benzene base</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE 231</td>
<td>58</td>
<td>2.8</td>
<td>0.984</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Benzene base (used with NE 226 or NE 230)</td>
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<tr>
<td>NE 233</td>
<td>74</td>
<td>1.118</td>
<td></td>
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<td></td>
<td>Internal counting, low cost</td>
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<tr>
<td>NE 240</td>
<td>67</td>
<td>1.760</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>196</td>
<td>Accepts more water than NE 220</td>
<td></td>
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</tr>
<tr>
<td>NE 250</td>
<td>50</td>
<td>1.760</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>For aqueous samples; low cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE 311</td>
<td>65</td>
<td>3.8</td>
<td>1.701</td>
<td>x</td>
<td>x</td>
<td>B 76</td>
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<td>Neutron detection: natural boron</td>
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<tr>
<td>NE 311A</td>
<td>65</td>
<td>3.7</td>
<td>1.701</td>
<td>x</td>
<td>x</td>
<td>10B 190</td>
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<td>Neutron detection: 10B</td>
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<tr>
<td>NE 313</td>
<td>62</td>
<td>4.0</td>
<td>1.220</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td></td>
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<td>Neutron detection: natural boron</td>
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<tr>
<td>NE 316</td>
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<td>1.411</td>
<td>x</td>
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<td></td>
<td>Neutron spectrometry</td>
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<tr>
<td>NE 321</td>
<td>57</td>
<td>15.7</td>
<td>1.568</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>10B 155</td>
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<td></td>
<td>Neutron detection: Jackson and Thomas type</td>
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<td>NE 323</td>
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<td>1.377</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>8, 191</td>
<td></td>
<td></td>
<td>Neutron spectrometry</td>
<td></td>
<td></td>
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</tbody>
</table>

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* i.e. Perspex, Lucite or Plexiglas.  
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ELLMAN’S REAGENT

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Ellman’s reagent—5,5′-dithiobis (2-nitrobenzoic acid) was designed by Dr. George L. Ellman as a specific reagent for thiol-groups. It has proved eminently successful as shown by the numerous papers describing its use since the original publication (1). Obviously we can only report the more important new developments in its use. A modification permitting determination of disulfide groups in proteins has been mentioned before (2). Since then a procedure for estimating disulfide and sulfhydryl compounds in trichloroacetic acid extracts of human blood and plasma has been reported (3). An interesting procedure for estimating disulfides depends on their reduction to monothiols with excess of reducing agents such as diithioerythritol, dithiothreitol, etc., the binding of excess diethyl reducing agent with sodium arsenite in a complex which blocks the thiol-groups, and the estimation of liberated monothiol-groups with Ellman’s reagent (4).

Another problem of considerable importance is to distinguish between protein-bound thiol-groups and those of thiols of low molecular weight. A procedure for this was developed soon after the original reagent (5), but this has now been refined and used for the investigation of the sulfhydryl groups of brain (6). The method depends on the fact that essentially only non-protein thiol-groups react in phosphate buffer, pH 6.8, with 0.167 mM Ellman’s reagent, while all thiol-groups react in phosphate buffer, pH 7.6, with 1.67 mM reagent. Bovine serum albumin was used for preparing the standard conditions for assaying thiol-groups, but the authors consider that bovine serum albumin might not be an adequate model for all proteins (6). Mixed disulfides between protein thiol-groups and thiols of low molecular weight are believed to be implicated in the radiation protection of cells (7). Numerous investigations now describe the use of Ellman’s reagent for detecting steric modifications of proteins and enzymes by denaturing agents which render originally masked thiol-groups accessible to the reagent. Thus native ferredoxin does not react with Ellman’s reagent, but in 4M guanidine hydrochloride 14 thiol-groups are detected (8). The gradual unmasking of thiol-groups in pancreatic α-amylase towards the reagent makes this an interesting story (9). Complete protection of thiol-groups in lactate dehydrogenase by forming the mixed disulfide with Ellman’s reagent with full recovery of activity after 24 h. storage at pH 7.2 is briefly mentioned as unpublished work (10). Activation of dihydrofolate reductase by Ellman’s reagent has also been reported (11).

The use of comparatively new 2,2′-dithiodipyridine (ALDRITHIOL-2) and 4,4′-dithiodipyridine (ALDRITHIOL-4) is also spreading rapidly (12). ALDRITHIOL-2 has been used in the determination of glutathione and of triphosphopyridine nucleotide (13, 14), while ALDRITHIOL-4 was used to estimate the thiol-groups of various thyroglobulins (15).

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