

**FOR CALIBRATORS WITH 6.0 V and HIGHER SOFTWARE**  
updated 3/8/06

Nuclide		Dial Value	Decay Scheme	Average Beta Energy KeV	Half-Life	Footnote(s)
<b>Ac-225</b>	Actinium	<b>44.0</b>	Alpha, Beta, etc		10 days. In equilibrium with daughters until Bi-209 (stable)	
<b>Am-241</b>	Americium	<b>40.4</b>	Alpha		434.7 years	
<b>As-76</b>	Arsenic	<b>25.1</b>	Beta -	1068	1.1 days	
<b>Au-198</b>	Gold	<b>23.0</b>	Beta -	406	2.69 days	
<b>Au-199</b>	Gold	<b>45.0</b>	Beta -	87	3.139 days	
<b>Ba-133</b>	Barium	<b>7.2</b>	EC		10.54 years	
<b>Bi-213</b>	Bismuth	<b>72.8</b>	Beta -	12.3	45.6 minutes	
<b>Br-75</b>	Bromine	<b>8.1</b>	Beta +, EC	499	1.62 hours H(r)=.00056 did not include Se <sup>75</sup>	
<b>Br-76</b>	Bromine	<b>4.8</b>	Beta +, EC	642	16.2 hours	
<b>Br-77</b>	Copper	<b>21.1</b>	Beta+, EC	1.12	2.376 days	<b>6</b>
<b>C-11</b>	Carbon	<b>9.3</b>	Beta +, EC	385	20.39 minutes	
<b>Cd-109</b>	Cadmium	<b>25.0</b>	EC		1.267 years	
<b>Ce/Ps-144</b>	Ce/Praseodymium	<b>63.0</b>	Beta - / Beta -	82 & 1209	283 days/17 minutes Footnote 3	<b>1 and 7</b>
<b>Co-55</b>	Cobalt	<b>5.3</b>	Beta +, EC	430	17.53 hours Fe <sup>55</sup> ignored, contribution insignificant	<b>18</b>
<b>Co-57</b>	Cobalt	<b>29.3</b>	EC		271.77 days	
<b>Co-58</b>	Cobalt	<b>10.6</b>	EC		70.9 days	
<b>Co-60</b>	Cobalt	<b>5.0</b>	Beta -	96	5.271 years	

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Cr-51	Chromium	299.0	EC		27.7 days	
Ce-134	Cesium	6.5	Beta -	157	2.06 years	
Cs-137	Cesium	17.4	Beta -	188	30.0 years	
Cu-61	Copper	11.5	Beta+, EC	306	3.408 hours	6
Cu-62	Copper	9.5	Beta +, EC	1280	9.74 minutes	
Cu-64	Copper	50.2	Beta -, Beta +	49.8 & 71	12.701 hours	
Cu-67	Copper	41.2	Beta -	142	2.58 days	
Dy-165	Dysprosium	98.6	Beta -	98.6	2.334 hours - includes Bremsstrahlung contributions	2
Eu-152	Europium	6.5	Beta, EC	496	13.33 years	
F-18	Flourine	9.6	Beta +, EC	242	1.83 hours	
Fe-52	Iron	11.1	Beta +, EC	189	8.275 hours	
Fe/Mn-52	Iron/Manganese	3.3	EC Beta + / EC; Beta +	189 & 1133	8.275 hrs/21.1 minutes	
Fe-59	Iron	10.2	Beta -	118	44.5 days	
Ga-67	Gallium	30.2	EC		3.261 days	
Ge/Ga-68	Germanium/ Gallium	10.1	EC / EC, Beta +	740	270.8 days / 1.14 hours	
Gd-153	Gadolinium	10.1	EC		241.6 days	
Hg-197	Mercury	21.6	EC		2.67 days	
Hg-203	Mercury	33.5	Beta -	58	46.6 days	
Ho-166	Holmium	84.5	Beta -	16.5	1.117 days - includes Bremsstrahlung contributions	2

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<b>I-122</b>	Iodine	<b>9.3</b>	EC, Beta +	1087	3.62 minutes	
<b>I-123</b>	Iodine	<b>12.9</b>	EC		13.2 hours	
<b>I-124</b>	Iodine	<b>7.6</b>	Beta +, EC	188	4.18 days	
<b>I-125</b>	Iodine	<b>11</b>	EC		60.14 days	<b>1 and 5</b>
<b>I-131</b>	Iodine	<b>22.2</b>	Beta -	182	8.04 days	
<b>In-111</b>	Indium	<b>12.7</b>	EC		2.807 days	
<b>In-113(m)</b>	Indium	<b>28.9</b>	IT		1.6 hours	
<b>Ir-192</b>	Iridium	<b>10.9</b>	Beta - & EC	171	73.83 days	
<b>Ir-196</b>	Iridium	<b>39.2</b>	D-	1170	52 second - includes Bremsstrahlung contributions	<b>2</b>
<b>Ir-196</b>	Iridium	<b>3.7</b>	B	337	1.4 hours	
<b>K-38</b>	Potassium	<b>4.2</b>	EC, Beta +	1204	7.636 minutes	
<b>K-43</b>	Potassium	<b>9.9</b>	B -	314	22.3 hours	
<b>La-140</b>	Lanthanum	<b>5.5</b>	Beta -	525	1.678 days	
<b>Lu-177</b>	Lutetium	<b>117.2</b>	Beta -	133	6.71 days	
<b>MO-99</b>	Molybdenum	<b>180.0</b>	Beta -	390	2.748 days In 1/4 inch lead wall breather shield	
<b>N-13</b>	Nitrogen	<b>9.3</b>	Beta +, EC	491	9.965 minutes	
<b>Na-22</b>	Sodium	<b>5.1</b>	Beta +, EC	195	2.6 years	
<b>Nb-95</b>	Niobium	<b>13.4</b>	Beta -	9.8	34.07 days	
<b>O-15</b>	Oxygen	<b>9.3</b>	Beta +, EC	735	2.037 minutes	

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Os-191	Osmium	25.3	Beta -	57.5	15.4 days	
P-32	Phosphorus	632.0	B - (Pure)	695	14.28 days	
Pb-203	Lead	14.6	EC		2.169 days	
Pd-103	Palladium	35.3	EC		16.97 days	
Pm-149	Promethium	51.5	Beta -	366	2.212 days - includes Bremsstrahlung, ~40%	2
Pt-195(m)	Platinum	20.6	IT		4.02 days	
Pt-197	Platinum	88.4	B-	193	18.3 hours	
Ra-223	Radium	28.0	Alpha			1 & 6
Ra-226	Radium	6.4	A, D -, etc.		1600 years	
Rb-82	Rubidium	8.8	EC, Beta +	1409	1.273 minutes	
Rb/Kr-81	Rubidium/Krypton	14.2	Beta+/IT, EC	132	4.6 hours/13 seconds	
Re-186	Rhenium	107.8	Beta -, EC	323	3.777 days - includes Bremsstrahlung contributions	2
Re-188	Rhenium	86.6	Beta -	765	16.98 hours - includes Bremsstrahlung contributions	2
Sb-124	Antimony	6.6	Beta -	105	60.2 days	
Sc-46	Scandium	5.6	Beta -	52	83.83 days	
Se-73	Selenium	6.8	Beta +, EC	368	7.15 hours H(r)=.0037, did not include As <sup>73</sup>	

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Se-75	Selenium	17.2	EC		119.8 days	
Sm-145	Samarium	10.0	EC		340 days	
Sm-153	Samarium	18.3	Beta -	225	1.946 days in plastic syringe	
Sm-156	Samarium	7.6	Beta -		9.4 hours H(r)=.0258, ignored Eu <sup>154</sup> daughter	
Sn/In-113	Tin/Indium	11.9	EC / IT		115 days/1.6 hours	
Sr-85	Strontium	18.7	EC		64.84 days	
Sr-87(m)	Strontium	29.6	IT		2.795 hours	
Sr-89(m)	Strontium	680	Beta -	583	50.55 days Metastron, Brems ...with Sr-85 impurity	2
Sr-89	Strontium (Pure Sr-89, NIST Grade *Brems)	768. 0	Beta -	583	50.55 days Pure Sr-89, NIST Grade, Brems	2
Ta-178	Tantalum	17.8	EC		9.31 minutes Pure	
Tc-99m	Technetium	33.6	IT		6.007 hours	
Tl-201	Thallium	18.8	EC		3.046 days	
W-178	Tungsten	71.0	EC		21.5 days Pure	

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Nucleide		Dial Value	Decay Scheme	Average Beta Energy KeV	Half-Life	Footnote(s)
<b>W-178/Ta-178 Equilibrium</b>	Tungsten/Tantalum	<b>14.2</b>	EC / EC		21.5 days / 9.31 minutes Ta-178 in equilibrium with W-178 (use for W contamination activity)	
<b>W/Re Eq-188</b>	Tungsten	<b>83.7</b>	B-	99 & 765	69.4 days includes Bremsstrahlung contributions from Re <sup>188</sup>	2
<b>Xe-127</b>	Xenon	<b>11.0</b>	EC		36.4 days	
<b>Xe-135</b>	Xenon	<b>19.0</b>	Beta -	100	5.245 days	
<b>Y-86</b>	Yttrium	<b>3.3</b>	Beta+	2.88	14.74 hours B+ contribution is ~17%	
<b>Y-88</b>	Yttrium	<b>5.1</b>	EC		106.6 days	
<b>Y-90</b>	Yttrium	<b>375.0</b>	Beta -	934	2.671 days Bremsstrahlung only, 10cc plastic syringe (from 2002 vol study)	1 and 2
<b>Yb-169</b>	Ytterbium	<b>6.0</b>	EC		32 days	
<b>Zn-65</b>	Zinc	<b>20.3</b>	EC, Beta+	2	244.1 days B+ contribution is ~3%	
<b>Zr/Y(m) 89</b>	Zirconium/Yttrium	<b>9.3</b>	Beta+ / II, EC	7.1	3.268 days/16.1 sec	