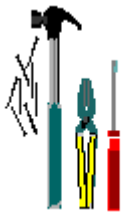

Gamma Ray Dose Constants

The "Specific Gamma Ray Dose Constant", sometimes known as the "Gamma Factor", is the dose rate at a specific distance from a given amount of a photon-emitting radionuclide. These constants are used frequently for radiation protection purposes. The following is a listing of Specific Gamma Ray Dose Constants for a variety of radionuclides, in units of Rem per hour (Rem/hr) at a distance of one (1) meter from a one (1) curie point source of that radionuclide.

Actinium

- Ac-225 - 0.191364
- Ac-227 - 0.0087468
- Ac-228 - 0.84397

Aluminum

- Al-26 - 1.49739
- Al-28 - 0.88208

Americium

- Am-241 - 0.313723
- Am-242 - 0.202612
- Am-242m - 0.18315
- Am-243 - 0.312872
- Am-244 - 1.17216
- Am-245 - 0.086617
- Am-246 - 0.079513

Antimony

- Sb-117 - 0.304103
- Sb-122 - 0.304251
- Sb-124 - 1.06671
- Sb-125 - 0.38036
- Sb-126 - 1.7982
- Sb-126m - 1.04488
- Sb-127 - 0.444
- Sb-129 - 0.85655

Argon

- Ar-41 - 0.69597

Arsenic

- As-72 - 1.16476
- As-73 - 0.140008
- As-74 - 0.54464
- As-76 - 0.274096
- As-77 - 0.0062863

Astatine

- At-211 - 0.22644
- At-217 - 0.000160247

Barium

- Ba-131 - 0.46028
- Ba-133 - 0.45547
- Ba-133m - 0.124764
- Ba-135m - 0.110038
- Ba-137m - 0.39997
- Ba-139 - 0.0285529
- Ba-140 - 0.164502
- Ba-141 - 0.57794
- Ba-142 - 0.56869

Berkelium

- Bk-250 - 0.67858

Beryllium

- Be-7 - 0.0343804

Bismuth

- Bi-206 - 2.5234
- Bi-207 - 1.33311
- Bi-208 - 1.5207
- Bi-211 - 0.047138
- Bi-212 - 0.194768
- Bi-213 - 0.11618
- Bi-214 - 0.83916

Bromine

- Br-77 - 0.71151
- Br-80 - 0.080142
- Br-80m - 0.703
- Br-82 - 1.61949
- Br-83 - 0.0051837
- Br-84 - 0.88504
- Br-85 - 0.039183

Cadmium

- Cd-109 - 0.184371
- Cd-111m - 0.313131
- Cd-115 - 1505160000
- Cd-115m - 0.0127021
- Cd-117 - 0.6438
- Cd-117m - 1.08595

Calcium

- Ca-45 - 2.98664E-08
- Ca-47 - 0.58497
- Ca-49 - 1.33755

Californium

- Cf-248 - 0.045473
- Cf-249 - 0.41403
- Cf-250 - 0.044844
- Cf-251 - 0.42994
- Cf-252 - 0.041847
- Cf-253 - 0.0007696
- Cf-254 - 4.8507E-08

Carbon

- C-11 - 0.71669

Cerium

- Ce-139 - 0.205498
- Ce-141 - 0.073223
- Ce-143 - 0.255041
- Ce-144 - 0.0233174

Cesium

- Cs-126 - 0.80142
- Cs-129 - 0.359825
- Cs-131 - 0.124431
- Cs-132 - 0.57572
- Cs-134 - 0.99937
- Cs-134m - 0.070448
- Cs-136 - 1.34384
- Cs-137 - 0.38184
- Cs-138 - 1.26614
- Cs-139 - 0.15762

Chlorine

- Cl-38 - 0.71854

Chromium

- Cr-49 - 0.75073
- Cr-51 - 0.023384

Cobalt

- Co-56 - 1.92585
- Co-57 - 0.151219
- Co-58 - 0.61383
- Co-58m - 9.7569E-05

- Co-60 - 1.37011
- Co-60m - 0.00335109
- Co-61 - 0.084582

Copper

- Cu-61 - 0.56832
- Cu-62 - 0.7067
- Cu-64 - 0.131942
- Cu-67 - 0.087431

Curium

- Cm-242 - 0.072113
- Cm-243 - 0.47582
- Cm-244 - 0.064417
- Cm-245 - 0.4514
- Cm-246 - 0.057387
- Cm-247 - 0.267029
- Cm-248 - 0.045399
- Cm-249 - 0.0148259

Dysprosium

- Dy-157 - 0.309209
- Dy-165 - 0.0229141
- Dy-166 - 0.05735

Einsteinium

- Es-253 - 0.0256077
- Es-254 - 0.5513
- Es-254m - 0.56203
- Es-255 - 0.00315573

Erbium

- Er-169 - 1.26022E-06
- Er-171 - 0.29637

Europium

- Eu-152 - 0.74444
- Eu-152m - 0.212602
- Eu-154 - 0.75554
- Eu-155 - 0.066748
- Eu-156 - 0.73704

Fermium

- Fm-254 - 0.041477
- Fm-255 - 0.322677

Fluorine

- F-18 - 0.69523

Francium

- Fr-221 - 0.044141
- Fr-223 - 0.33041

Gadolinium

- Gd-153 - 0.172383
- Gd-159 - 0.039183
- Gd-162 - 0.308617

Gallium

- Ga-66 - 1.29648
- Ga-67 - 0.111148
- Ga-68 - 0.66193
- Ga-72 - 1.45632

Germanium

- Ge-68 - 0.060458
- Ge-71 - 0.061161
- Ge-77 - 0.71558

Gold

- Au-194 - 0.66008
- Au-195 - 0.087394
- Au-195m - 0.152884
- Au-196 - 0.369704
- Au-198 - 0.291634
- Au-199 - 0.069042

Hafnium

- Hf-181 - 0.39257

Holmium

- Ho-166 - 0.023199
- Ho-166m - 1.0619

Indium

- In-111 - 0.50172
- In-113m - 0.242979
- In-114 - 0.0230251
- In-114m - 0.150738
- In-115m - 0.197173
- In-116m - 1.3542
- In-117 - 0.50283
- In-117m - 0.11322

Iodine

- I-122 - 0.70337
- I-123 - 0.276686
- I-124 - 0.7585
- I-125 - 0.274984
- I-126 - 0.39035
- I-128 - 0.059792
- I-129 - 0.125837
- I-130 - 1.40267
- I-131 - 0.282939
- I-132 - 1.42746
- I-133 - 0.40885
- I-134 - 1.57287
- I-135 - 0.86099
- I-136 - 1.26429

Iridium

- Ir-190 - 0.99197
- Ir-190m(1.2h) - 2.2644E-07
- Ir-190m(3.2h) - 0.055463
- Ir-192 - 0.59163
- Ir-193m - 0.00037629
- Ir-194 - 0.061901
- Ir-194m - 1.61764

Iron

- Fe-52 - 0.52281
- Fe-59 - 0.66193

Krypton

- Kr-79 - 0.60347
- Kr-81 - 0.43364
- Kr-83m - 0.118733
- Kr-85 - 0.00156584
- Kr-85m - 0.160136
- Kr-87 - 0.43253
- Kr-88 - 1.02453
- Kr-89 - 0.97162
- Kr-90 - 0.76701

Lanthanum

- La-141 - 0.0226144
- La-142 - 1.35272

Lead

- Pb-203 - 0.67636
- Pb-204m - 1.3505
- Pb-205 - 0.251193
- Pb-210 - 0.251637
- Pb-211 - 0.0363932
- Pb-212 - 0.273393
- Pb-214 - 0.323454
- Pd-103 - 0.230103
- Pd-109 - 0.0004847

Lutetium

- Lu-177 - 0.0282532
- Lu-177m - 0.78144

Magnesium

- Mg-27 - 0.53613
- Mg-28 - 0.87875

Manganese

- Mn-52 - 2.0091
- Mn-52m - 1.44411
- Mn-54 - 0.51134
- Mn-56 - 0.92352
- Mn-57 - 0.112147

Mercury

- Hg-197 - 0.069338
- Hg-197m - 0.076183
- Hg-203 - 0.253117

Molybdenum

- Mo-101 - 0.88467
- Mo-91 - 0.70226
- Mo-93 - 0.293632
- Mo-99 - 0.112924

Neodynium

- Nd-147 - 0.139453
- Nd-149 - 0.300144

Neptunium

- Np-235 - 0.258223
- Np-236 - 1.04821
- Np-236m - 0.23643
- Np-237 - 0.46287
- Np-238 - 0.55389
- Np-239 - 0.51282
- Np-240 - 1.41562
- Np-240m - 0.42328

Nickel

- Ni-56 - 1.08817
- Ni-57 - 1.07707
- Ni-65 - 0.297406

Niobium

- Nb-90 - 2.44089
- Nb-91 - 0.326784
- Nb-91m - 0.26492
- Nb-92 - 1.26318
- Nb-92m - 0.89281
- Nb-93m - 0.052577
- Nb-94 - 0.97976
- Nb-94m - 0.202797
- Nb-95 - 0.48026
- Nb-95m - 0.23643
- Nb-96 - 1.5244
- Nb-97 - 0.43475
- Nb-97m - 0.46694

Nitrogen

- N-13 - 0.71706
- N-16 - 1.47408

Osmium

- Os-185 - 0.4847
- Os-190m - 1.11666
- Os-191 - 0.067969
- Os-191m - 0.0053613
- Os-193 - 0.052318

Oxygen

- O-15 - 0.7178

Platinum

- Pt-191 - 0.243756
- Pt-193m - 0.0172013
- Pt-195m - 0.075073
- Pt-197 - 0.0208939
- Pt-197m - 0.071447

Plutonium

- Pu-236 - 0.088985
- Pu-237 - 0.38443
- Pu-238 - 0.078995
- Pu-239 - 0.0301365
- Pu-240 - 0.07511
- Pu-242 - 0.062308
- Pu-243 - 0.092833
- Pu-244 - 0.054094

- Pu-245 - 0.38702

Polonium

- Po-209 - 0.00363007
- Po-210 - 5.2688E-06
- Po-211 - 0.0049136
- Po-213 - 1.90402E-05
- Po-214 - 5.1726E-05
- Po-215 - 0.000105857
- Po-216 - 8.9688E-06

Potassium

- K-40 - 0.081696
- K-42 - 0.143153
- K-43 - 0.67007

Praseodynium

- Pr-142 - 0.0299922
- Pr-143 - 5.6388E-09
- Pr-144 - 0.01702
- Pr-144m - 0.0367521

Promethium

- Pm-143 - 0.266992
- Pm-144 - 1.09446
- Pm-145 - 0.089466
- Pm-146 - 0.54094
- Pm-147 - 2.67584E-06
- Pm-148 - 0.330669
- Pm-148m - 1.31979
- Pm-149 - 0.0085729
- Pm-151 - 0.262182

Protactinium

- Pa-230 - 0.88319
- Pa-231 - 0.37407
- Pa-233 - 0.49395
- Pa-234 - 1.98172
- Pa-234m - 0.0102712

Radium

- Ra-222 - 0.0078255
- Ra-223 - 0.325193
- Ra-224 - 0.0109779
- Ra-225 - 0.154068
- Ra-226 - 0.0121138

Radon

- Rn-218 - 0.00050579
- Rn-219 - 0.052503
- Rn-220 - 0.000359751
- Rn-222 - 0.00027343

Rhenium

- Re-182 - 1.13886
- Re-182m - 0.73778
- Re-183 - 0.157509
- Re-184 - 0.58201
- Re-184m - 0.284086
- Re-186 - 0.0181633
- Re-188 - 0.040478

Rhodium

- Rh-103m - 0.0255744
- Rh-105 - 0.058756
- Rh-105m - 0.157287
- Rh-106 - 0.138158

Rubidium

- Rb-81 - 0.83768
- Rb-82 - 0.77848
- Rb-83 - 0.77145
- Rb-84 - 0.86062
- Rb-86 - 0.053946
- Rb-88 - 0.321937
- Rb-89 - 1.0952
- Rb-90 - 0.94276
- Rb-90m - 1.63873

Ruthenium

- Ru-103 - 0.33189
- Ru-105 - 0.51689

- Ru-97 - 0.44178

Samarium

- Sm-151 - 9.0354E-05
- Sm-153 - 0.09028

Scandium

- Sc-44 - 1.33274
- Sc-46 - 1.16735
- Sc-46m - 0.066933
- Sc-47 - 0.08029
- Sc-48 - 1.89329
- Sc-49 - 0.00052059

Selenium

- Se-73 - 1.09853
- Se-75 - 0.85951

Silicon

- Si-31 - 0.00048322

Silver

- Ag-106m - 1.93769
- Ag-108 - 0.0162763
- Ag-108m - 1.27132
- Ag-109m - 0.100714
- Ag-110 - 0.0205646
- Ag-110m - 1.65242
- Ag-111 - 0.0197173

Sodium

- Na-22 - 1.3394
- Na-24 - 1.93769

Strontium

- Sr-82 - 0.39405
- Sr-85 - 0.75924
- Sr-85m - 0.222148
- Sr-87m - 0.29637
- Sr-89 - 8.1585E-05
- Sr-91 - 0.41366
- Sr-92 - 0.72002
- Sr-93 - 1.35605

Tantalum

- Ta-182 - 0.77182

Technetium

- Tc-95 - 0.77404
- Tc-95m - 0.71743
- Tc-96 - 1.81263
- Tc-96m - 0.16391
- Tc-97 - 0.281052
- Tc-97m - 0.193621
- Tc-98 - 0.8991
- Tc-99 - 4.5954E-07
- Tc-99m - 0.1227
- Tc-101 - 0.255892

Tellurium

- Te-121 - 0.53835
- Te-121m - 0.248011
- Te-123 - 0.099419
- Te-123m - 0.194657
- Te-125m - 0.228216
- Te-127 - 0.00348836
- Te-127m - 0.073149
- Te-129 - 0.067821
- Te-129m - 0.073889
- Te-131 - 0.298775
- Te-131m - 0.90724
- Te-132 - 0.279313
- Te-133 - 0.58608
- Te-133m - 1.36493
- Te-134 - 0.64047

Terbium

- Tb-157 - 0.0089762
- Tb-160 - 0.66156
- Tb-162 - 0.71188

Thallium

- Tl-200 - 0.83361
- Tl-201 - 0.087764
- Tl-202 - 0.349206
- Tl-204 - 0.00111518
- Tl-207 - 0.00130388
- Tl-208 - 1.70385
- Tl-209 - 1.29352
- Tl-210 - 1.70237

Thorium

- Th-226 - 0.067266
- Th-227 - 0.42365
- Th-228 - 0.079254
- Th-229 - 0.73593
- Th-230 - 0.068857
- Th-231 - 0.54501
- Th-232 - 0.068376
- Th-233 - 0.095719
- Th-234 - 0.075406

Thullium

- Tm-170 - 0.0061901
- Tm-171 - 0.00096089

Tin

- Sn-113 - 0.179228
- Sn-117m - 0.251452
- Sn-119m - 0.103193
- Sn-123 - 0.0039294
- Sn-125 - 0.172938
- Sn-126 - 0.126096

Titanium

- Ti-44 - 0.144633
- Ti-45 - 0.61161
- Ti-51 - 0.26381

Tungsten

- W-181 - 0.051393
- W-185 - 2.02205E-05
- W-187 - 0.328782
- W-188 - 0.00133755

Uranium

- U-230 - 0.091131
- U-231 - 0.7844
- U-232 - 0.088911
- U-233 - 0.0291042
- U-234 - 0.077589
- U-235 - 0.338883
- U-236 - 0.073704
- U-237 - 0.58793
- U-238 - 0.065231
- U-239 - 0.13431
- U-240 - 0.284382

Vanadium

- V-48 - 1.70126
- V-52 - 0.76109

Xenon

- Xe-122 - 0.180079
- Xe-123 - 0.52392
- Xe-125 - 0.356014
- Xe-127 - 0.345247
- Xe-129m - 0.228105
- Xe-131m - 0.093721
- Xe-133 - 0.102971
- Xe-133m - 0.112258
- Xe-135 - 0.189477
- Xe-135m - 0.320087
- Xe-137 - 0.123802
- Xe-138 - 0.62123

Ytterbium

- Yb-169 - 0.326969
- Yb-175 - 0.0304621

Yttrium

- Y-86 - 2.32804

- Y-87 - 0.68857
- Y-88 - 1.78303
- Y-90m - 0.48692
- Y-91 - 0.00199911
- Y-91m - 0.38036
- Y-92 - 0.146927
- Y-93 - 0.051652

Zinc

- Zn-62 - 0.33263
- Zn-65 - 0.330188
- Zn-69 - 4.3216E-06
- Zn-69m - 0.295371

Zirconium

- Zr-86 - 0.88171
- Zr-88 - 0.6327
- Zr-89 - 0.98494
- Zr-95 - 0.46546
- Zr-97 - 0.108114