

PRNC 109 PUERTO RICO NUCLEAR CENTER Radioactive Decay Correction Tables October 1967 OPERATED BY UNIVERSITY OF PUERTO RICO UNDER CONTRACT NO. AT (40-0)1833 FOR U.S. ATOMIC ENERGY COMMISSION ---Page Break--- 7 Radioactive Decay Correction Table Owen H. Hejer, Anne S. Kay, and J. Elisa Trabal Puerto Rico Nuclear Center Mayaguez, Puerto Rico 00708 October, 1967 ---Page Break--- : . Arsenic - 78 week decay constant 2070 = ee Chlorine = 34 - . - - - - Pe ---Page Break--- Zinc-69 = 5 = Tine-7200-5 Appendix, T+ Fortran Program = =~ IT = Isotopes of Similar Half-lives 5 59 a ---Page Break--- ' 8 per Puerto Rico The decay of a radioactive isotope is governed by the equation $A_t = A_0 e^{-\lambda t}$ where A_0 is the initial activity, A_t is the activity after time t and λ is the decay constant. The decay constant (λ) is related to the half-life ($T_{1/2}$) by the equation $\lambda = 0.693/T_{1/2}$. The radioactive decay correction tables give the fraction (A_t/A_0) of activity remaining after various intervals of time. The data was calculated on an IBM 1620 computer using a Fortran II program (see appendix). The isotopes covered are those of moderately short half-life and do not generally duplicate tables reported elsewhere (1,2,3). The data has been rounded to six significant figures, and the decimal exponent, where necessary, is indicated after the number. Thus, 1.00000 + 0L indicates 1.00000 and 0.391457 - 02 indicates 0.00391457. For intervals longer than those given in these tables, the fraction of remaining activity can be obtained by multiplying the factors for shorter time intervals, since if $t = t_1 + t_2 + t_3 + \dots$ then $A_t/A_0 = A_{t_1}/A_0 \times A_{t_2}/A_{t_1} \times A_{t_3}/A_{t_2} \times \dots$. For example, the fraction of silicon-31 remaining after 30 hours can be found by multiplying the fractions for 24 hours and 6 hours: $0.001746 \times 0.20 = 0.0003569$ or by squaring the fraction at 15 hours, $(0.01889)^2 = 0.003568$. A number of other isotopes have half-lives similar to those reported in the tables, while others have numerically similar half-lives with a ---Page Break--- -2- different unit of time.

(hours instead of minutes or days instead of hours) These cases are tabulated in the appendix and permit the present tables for 28 isotopes to be extended to 85. REFERENCES: 1. "Radiological Health Handbook," Division of Radiological Health, U.S. Department of Health Education and Welfare, Washington, D.C., 1960. 2. G. Pe Hunter and V. F. Mitchell, "Tables of Factors for Correcting for Radioactive Decay," United Kingdom Atomic Energy Authority Report Rke3T, 1963. K. K. Falter, "Radioactive Decay Correction Factors," Division of Radiological Health, U.S. Department of Health, Education and Welfare, Washington, D.C., 1965. ---Page Break--- 26 12.00 +269008-01 60.00 4140872-07 ' anette 707803-08 ---Page Break--- A» 108640 st = 1.00 min Tmax = 320.00 min Dy r 1 F 0.00 +200000+02 \$1.00 +457275-02 99748 52.00 Teraua3=02 2:00 Teossu7 53.00 Ta70186-02 S726383 suloo 1333074-02 te5s367 55100 {299683-02 1589665 56.00 t2es639-02 1530552, 57.00 {2u7608-02 tu77362 50.00 218286-02 1829508 59.00 196402-02 Sse6uu7 60.00 117671302 i3u7705 61.00 1158997-02 Sauzeu7 62.00 1183057-02 i2e14e4 59.00 1128716-02 1253265, 54.00 t115e12-02 227675, 55.00 T1o4201-02 1205030 86.00 1937550-08 S1eu75, 87.00 Tau3s60-03 os . ws. Atuninun = 2 Ties ese nin AI? 116598) 58.00 l1se9si-03 Siwgau2 69:00 {682901-03 tisua70 70.00 Teisuwo-03 1120893 71100 Tsszewi-03 [108779 72:00 tas7428-03 1978734-02, 73100 tau7551-03 e80615-01 74!00 {402683-03 1792332-01, 75100 {362526-03 712899-01 78:00 1325991-03 leuiuso-02 77.00 \$293310-03 1577126-01 78.00 1263905-03 1519268-01, 78.00 123784a-03 tue7211-01, 20.00 121364403, \$u20372-02 £1.00 1152226209 | 1378229-01, 22.00 1272955203. {340311-02 23100 1155616-03 1306108-02. 84.00 tiwooas-03 le7sese-on 85.00 1125978-03 \$247879-01 25.00 Tiis3u9-03 1223023-0 87200 1101985-03 \$200670-03, 82.00 1917613-04 1180552-01 89.00 1a75621-00 1162652-02 30.00 i7uzesi-o4 Siw6166-01 81.00 te68379-04 \$191522-02 52.00 1801373-08 1118328-01 83:00 iski08s-o8 106465-01, 94.00 Ingeauo-ou tes7szi-02 28.00 Tuaeos4-ou ie61888-02 96.00

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ase Praseodymium-20 380 Barium-241 ion Bromine=80 Lon Bismuth-199 25m Iodine-128 25m
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Curium-141 32.54 Chlorine-34 33m Cerium-143 33h Chlorine-36 39m Cestun-128 Vanadium-52
3.778 Cesium-132 Aluminum-29 6.588 Cestun-139 9.58 Magnesium-27 9.5m Copper-62 9.98
Nitrogen-13 don Curium-238 265h Neptunium-65 2.56n Tennessine-248 250 Iodine-128 25m
Francium-251 asa Bromine-82 asa Einsteinium-254 asd Bromine=82 asa Europium-144 don
Promethium=60 er, Gadolinium-159 ash Bromine=80 en Gadolinium-262 3.78 Vanadium-52 3.778
Germanium-66 2.5h Nickel-65 2.56% Helium-161 2.5h Nickel-65 258m ---Page Break--- DT \ <2 - |
ractoape ap Sinitar isotope 1a Molybdenum-166 26.78 Chlorine-28 37.38 ! Holmium-159 33m
Chlorine-34 33m Rhenium-222 20a Antimony-122 ane Indium-112 20.78 Carbon-11 20.50 ,
Iodine-132 2.3b Aluminum-26 2.38 * Iodine-199 20.8 Californium-70 21.0% Iodine-130 s2.58
Zinc-69 sen Iodine-135 em Cadmium-107 6.7 Tantalum-134 6.58 Aluminum-29 6.8 Lanthanum-196
o.sm | Magnesium-27 ose | Samarium-aa Zinc=71 seb ! Lead-196 atm Chlorine-38 37.8m i 10.68
Cobolt-60H 20.5 176 Gene Zinc-7 sen i Angen Californium-70 21.08 aise 21.08 2.188
Antimony-122 2a Neodymium-109 a Ridgeline-28 2.868 | Neptunium-239 2.358 Aluminum, 2.3m |
Neptunium-7 aise Strontium-82 aise | Niobium-92 210.08 Nitrogen-13 10m *. Niobium-oun 6.68
Aluminum-29 6.560 Centium-190% 9.58 Magnesium-27 9.50 ! Osmium-195 6.50 Aluminum-29
6.56m Palladium-116 awe Aluminium-26 aoe Platinum-186 2.58 Nickel-65 2.56h ---Page Break--- +
62 isotopes say Sinitar Isotope ean Platinum-197 20h Carbon-22 20.58 Praseodymium-138 s.9h
Titanium-51 5.8m Polonium-201, ten Promethium-80 Le Polonium-208 a.8h

nine=?1 38h Plutonium-239 20m Carbon-22 20.5 Protactinium-262 20n Carbon-11 20.5
Protactinium-229 nse Bromine-82 asa Protactinium-206 6.66 Cadmium-107 6.7m Radon-222 asm
Tantalum-128 250 Rhodium-266" 18.78 Selenium-82 38.6 Rhodium-110 aon Antimony-28 2.30
Rhodium-105 ase Bromine-32 aise Rubidium-101 21m Gallium-70 21.0 Rubidium-106 10.78
Selenium-82 18.6 Rubidium-08 10m Bromine-60 1s Ruthenium-97 288 Antimony-122 ave
Selenium-iss 25m Iodine-128 25m Scandium-46 ase Barium-199 osm Selenium-23 25
Tantalum-128 25m Silver-208 2.4m Antimony-26 2am Silver-215 Gallium-70 2am Strontium-51
Magnesium-27 9.50 Sulfur-27 Copper-66 Sam Tantalum-163 5.24 Copper-66 Sam Tantalum-196
Technetium-105 Thulium-168 Cobalt-60m Nitrogen-13 Barium-139 ---Page Break--- Tin-109
Tin-125" Xenon-125 Yttrium-93 Yttrium-96 Yttrium-04 = ous Nitrogen-13 Cobalt-60m Zinc-71 Roe,
10.58 3.8b ---Page Break---