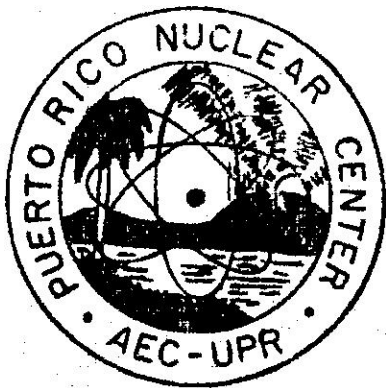


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PUERTO RICO NUCLEAR CENTER

Radioactive Decay Correction Tables

October 1967



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Radioactive Decay Correction Tables

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Puerto Rico Nuclear Center

Mayaguez, Puerto Rico

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INTRODUCTION

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

$$\lambda = \ln 2 / T_{1/2} = 0.693 / T_{1/2}$$

These 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 .100000 + 01 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 $t = t_1 + t_2 + t_3 + \dots$

$$\text{then } A_t/A_0 = e^{-\lambda t} = e^{-\lambda(t_1 + t_2 + t_3 + \dots)} = e^{-\lambda t_1} \cdot e^{-\lambda t_2} \cdot e^{-\lambda t_3} \dots$$

For example, the fraction of silicon-31 remaining after 30 hours can be found by multiplying the fractions for 24 hours and 6 hours

$$0.001746 \times 0.2044 = 0.0003569$$

or by squaring the fraction at 15 hours.

$$(0.01889)^2 = 0.0003568$$

A number of other isotopes have half-lives similar to those reported in the tables, while others have numerically similar half-lives with a

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 cases.

REFERENCES

1. "Radiological Health Handbook," Division of Radiological Health, U.S. Department of Health Education and Welfare, Washington, D. C., 1960.
2. G. F. Hunter and V. F. Mitchell, "Tables of Factors for Correcting for Radioactive Decay," United Kingdom Atomic Energy Authority Report R4237, 1963.
3. K. H. Falter, "Radioactive Decay Correction Factors," Division of Radiological Health, U.S. Department of Health, Education and Welfare, Washington, D.C., 1965.

Aluminum - 28

T 1/2 = 2.3 min

Al²⁸

A = .301300

ΔT = 1.00 min

T_{max} = 60.00 min

T

F

T

F

0.00	.100000+01	48.00	.523672-06
1.00	.739856	49.00	.387442-06
2.00	.547387	50.00	.286651-06
3.00	.404987	51.00	.212080-06
4.00	.299632	52.00	.156909-06
5.00	.221684	53.00	.116090-06
6.00	.164015	54.00	.858899-07
7.00	.121347	55.00	.635461-07
8.00	.897794-01	56.00	.470150-07
9.00	.664238-01	57.00	.347843-07
10.00	.491440-01	58.00	.257354-07
11.00	.363595-01	59.00	.190404-07
12.00	.269008-01	60.00	.140872-07
13.00	.199027-01		
14.00	.147251-01		
15.00	.108945-01		
16.00	.806034-02		
17.00	.596349-02		
18.00	.441212-02		
19.00	.326433-02		
20.00	.241513-02		
21.00	.178685-02		
22.00	.132201-02		
23.00	.978099-03		
24.00	.723652-03		
25.00	.535398-03		
26.00	.396117-03		
27.00	.293070-03		
28.00	.216829-03		
29.00	.160422-03		
30.00	.118689-03		
31.00	.878131-03		
32.00	.649690-04		
33.00	.480677-04		
34.00	.355632-04		
35.00	.263116-04		
36.00	.194668-04		
37.00	.144026-04		
38.00	.106559-04		
39.00	.788380-05		
40.00	.583288-05		
41.00	.431549-05		
42.00	.319284-05		
43.00	.236224-05		
44.00	.174772-05		
45.00	.129306-05		
46.00	.956677-06		
47.00	.707803-06		

Aluminum - 29

T 1/2 = 6.56 min

Al²⁹

A = .105640

ΔT = 1.00 min

T_{max} = 120.00 min

T	F	T	F
0.00	.100000+01	51.00	.457275-02
1.00	.899748	52.00	.411433-02
2.00	.809547	53.00	.370186-02
3.00	.728389	54.00	.333074-02
4.00	.655367	55.00	.299683-02
5.00	.589665	56.00	.269639-02
6.00	.530551	57.00	.242608-02
7.00	.477362	58.00	.218286-02
8.00	.429506	59.00	.196402-02
9.00	.386447	60.00	.176713-02
10.00	.347705	61.00	.158997-02
11.00	.312847	62.00	.143057-02
12.00	.281484	63.00	.128716-02
13.00	.253265	64.00	.115812-02
14.00	.227875	65.00	.104201-02
15.00	.205030	66.00	.937550-03
16.00	.184475	67.00	.843560-03
17.00	.165981	68.00	.758991-03
18.00	.149341	69.00	.682901-03
19.00	.134370	70.00	.614440-03
20.00	.120899	71.00	.552841-03
21.00	.108779	72.00	.497418-03
22.00	.978734-01	73.00	.447551-03
23.00	.880615-01	74.00	.402683-03
24.00	.792332-01	75.00	.362314-03
25.00	.712899-01	76.00	.325991-03
26.00	.641430-01	77.00	.293310-03
27.00	.577126-01	78.00	.263905-03
28.00	.519268-01	79.00	.237448-03
29.00	.467211-01	80.00	.213644-03
30.00	.420372-01	81.00	.192226-03
31.00	.378229-01	82.00	.172955-03
32.00	.340311-01	83.00	.155616-03
33.00	.306194-01	84.00	.140015-03
34.00	.275498-01	85.00	.125978-03
35.00	.247879-01	86.00	.113349-03
36.00	.223029-01	87.00	.101985-03
37.00	.200670-01	88.00	.917613-04
38.00	.180552-01	89.00	.825621-04
39.00	.162452-01	90.00	.742851-04
40.00	.146166-01	91.00	.668379-04
41.00	.131512-01	92.00	.601373-04
42.00	.118328-01	93.00	.541085-04
43.00	.106465-01	94.00	.486840-04
44.00	.957921-02	95.00	.438034-04
45.00	.861888-02	96.00	.394120-04
46.00	.775482-02	97.00	.354609-04
47.00	.697739-02	98.00	.319059-04
48.00	.627790-02	99.00	.287073-04
49.00	.564853-02	100.00	.258293-04
50.00	.508226-02	101.00	.232399-04

102.00	.209101-04
103.00	.188138-04
104.00	.169277-04
105.00	.152307-04
106.00	.137038-04
107.00	.123299-04
108.00	.110938-04
109.00	.998167-05
110.00	.898099-05
111.00	.808064-05
112.00	.727054-05
113.00	.654166-05
114.00	.588585-05
115.00	.529578-05
116.00	.476487-05
117.00	.428719-05
118.00	.385739-05
119.00	.347068-05
120.00	.312274-05

Sb¹²²

Antimony - 122

T 1/2 = 2.8 d

A = .247500

AT = .50 d

T_{max} = 30.00 d

T	F	T	F
0.00	.100000+01	24.50	.232566-02
0.50	.883601	25.00	.205496-02
1.00	.780750	25.50	.181576-02
1.50	.689871	26.00	.160441-02
2.00	.609571	26.50	.141765-02
2.50	.538617	27.00	.125264-02
3.00	.475923	27.50	.110684-02
3.50	.420526	28.00	.978001-03
4.00	.371577	28.50	.864162-03
4.50	.328325	29.00	.763574-03
5.00	.290109	29.50	.674695-03
5.50	.256340	30.00	.596161-03
6.00	.226502		
6.50	.200138		
7.00	.176842		
7.50	.156257		
8.00	.138069		
8.50	.121998		
9.00	.107798		
9.50	.952500-01		
10.00	.841630-01		
10.50	.743665-01		
11.00	.657103-01		
11.50	.580616-01		
12.00	.513093-01		
12.50	.453316-01		
13.00	.400551-01		
13.50	.353927-01		
14.00	.312730-01		
14.50	.276328-01		
15.00	.244164-01		
15.50	.215743-01		
16.00	.190631-01		
16.50	.168442-01		
17.00	.148835-01		
17.50	.131511-01		
18.00	.116203-01		
18.50	.102677-01		
19.00	.907257-02		
19.50	.801653-02		
20.00	.708341-02		
20.50	.625890-02		
21.00	.553037-02		
21.50	.488664-02		
22.00	.431784-02		
22.50	.381525-02		
23.00	.337115-02		
23.50	.297875-02		
24.00	.263202-02		

Arsenic - 78

T 1/2 = 91 m

As⁷⁸

A = .007615 ΔT = 8.00 min

T_{max} = 1440.00 min

T

F

T

F

0.00	.100000+01	384.00	.537098-01
8.00	.940898	392.00	.505355-01
16.00	.885290	400.00	.475487-01
24.00	.832968	408.00	.447385-01
32.00	.783738	416.00	.420944-01
40.00	.737418	424.00	.396066-01
48.00	.693836	432.00	.372658-01
56.00	.652829	440.00	.350633-01
64.00	.614246	448.00	.329910-01
72.00	.577943	456.00	.310412-01
80.00	.543786	464.00	.292066-01
88.00	.511647	472.00	.274805-01
96.00	.481408	480.00	.258563-01
104.00	.452956	488.00	.243282-01
112.00	.426186	496.00	.228903-01
120.00	.400997	504.00	.215375-01
128.00	.377298	512.00	.202646-01
136.00	.354999	520.00	.190669-01
144.00	.334018	528.00	.179400-01
152.00	.314277	536.00	.168798-01
160.00	.295703	544.00	.158821-01
168.00	.278226	552.00	.149435-01
176.00	.261783	560.00	.140603-01
184.00	.246311	568.00	.132293-01
192.00	.231754	576.00	.124474-01
200.00	.218057	584.00	.117118-01
208.00	.205169	592.00	.110196-01
216.00	.193043	600.00	.103683-01
224.00	.181634	608.00	.975554-02
232.00	.170899	616.00	.917897-02
240.00	.160799	624.00	.863648-02
248.00	.151295	632.00	.812605-02
256.00	.142354	640.00	.764579-02
264.00	.133940	648.00	.719391-02
272.00	.126024	656.00	.676874-02
280.00	.118576	664.00	.636870-02
288.00	.111568	672.00	.599230-02
296.00	.104974	680.00	.563815-02
304.00	.987701-01	688.00	.530492-02
312.00	.929327-01	696.00	.499139-02
320.00	.874402-01	704.00	.469639-02
328.00	.822724-01	712.00	.441883-02
336.00	.774099-01	720.00	.415767-02
344.00	.728349-01	728.00	.391195-02
352.00	.685302-01	736.00	.368074-02
360.00	.644800-01	744.00	.346321-02
368.00	.606691-01	752.00	.325853-02
376.00	.570835-01	760.00	.306594-02

768.00	.288474-02	1216.00	.951705-04
776.00	.271425-02	1224.00	.895458-04
784.00	.255383-02	1232.00	.842535-04
792.00	.240290-02	1240.00	.792740-04
800.00	.226088-02	1248.00	.745888-04
808.00	.212726-02	1256.00	.701805-04
816.00	.200154-02	1264.00	.660327-04
824.00	.188324-02	1272.00	.621301-04
832.00	.177194-02	1280.00	.584581-04
840.00	.166722-02	1288.00	.550032-04
848.00	.156868-02	1296.00	.517524-04
856.00	.147597-02	1304.00	.486937-04
864.00	.138874-02	1312.00	.458159-04
872.00	.130666-02	1320.00	.431081-04
880.00	.122944-02	1328.00	.405603-04
888.00	.115677-02	1336.00	.381632-04
896.00	.108841-02	1344.00	.359077-04
904.00	.102408-02	1352.00	.337855-04
912.00	.963556-03	1360.00	.317887-04
920.00	.906608-03	1368.00	.299099-04
928.00	.853026-03	1376.00	.281422-04
936.00	.802611-03	1384.00	.264790-04
944.00	.755176-03	1392.00	.249140-04
952.00	.710544-03	1400.00	.234416-04
960.00	.668550-03	1408.00	.220561-04
968.00	.629037-03	1416.00	.207526-04
976.00	.591860-03	1424.00	.195261-04
984.00	.556880-03	1432.00	.183720-04
992.00	.523968-03	1440.00	.172862-04
1000.00	.493001-03		
1008.00	.463864-03		
1016.00	.436449-03		
1024.00	.410654-03		
1032.00	.386384-03		
1040.00	.363548-03		
1048.00	.342061-03		
1056.00	.321845-03		
1064.00	.302824-03		
1072.00	.284926-03		
1080.00	.268087-03		
1088.00	.252242-03		
1096.00	.237334-03		
1104.00	.223308-03		
1112.00	.210110-03		
1120.00	.197692-03		
1128.00	.186008-03		
1136.00	.175015-03		
1144.00	.164671-03		
1152.00	.154939-03		
1160.00	.145782-03		
1168.00	.137166-03		
1176.00	.129059-03		
1184.00	.121431-03		
1192.00	.114255-03		
1200.00	.107502-03		
1208.00	.101149-03		

Barium - 139

T 1/2 = 85 min

Ba¹³⁹

A = .008152

ΔT = 8.00 min

T_{max} = 1440.00 min

T	F	T	F
0.00	.100000+01	384.00	.437017-01
8.00	.936865	392.00	.409426-01
16.00	.877716	400.00	.383577-01
24.00	.822302	408.00	.359360-01
32.00	.770386	416.00	.336672-01
40.00	.721747	424.00	.315416-01
48.00	.676180	432.00	.295502-01
56.00	.633489	440.00	.276846-01
64.00	.593494	448.00	.259367-01
72.00	.556024	456.00	.242992-01
80.00	.520919	464.00	.227651-01
88.00	.488031	472.00	.213278-01
96.00	.457219	480.00	.199813-01
104.00	.428353	488.00	.187197-01
112.00	.401309	496.00	.175379-01
120.00	.375972	504.00	.164306-01
128.00	.352235	512.00	.153933-01
136.00	.329997	520.00	.144214-01
144.00	.309163	528.00	.135109-01
152.00	.289644	536.00	.126579-01
160.00	.271357	544.00	.118588-01
168.00	.254225	552.00	.111101-01
176.00	.238174	560.00	.104086-01
184.00	.223137	568.00	.975148-02
192.00	.209049	576.00	.913582-02
200.00	.195851	584.00	.855903-02
208.00	.183486	592.00	.801866-02
216.00	.171902	600.00	.751240-02
224.00	.161049	608.00	.703811-02
232.00	.150881	616.00	.659376-02
240.00	.141355	624.00	.617746-02
248.00	.132431	632.00	.578745-02
256.00	.124070	640.00	.542206-02
264.00	.116236	648.00	.507974-02
272.00	.108898	656.00	.475903-02
280.00	.102023	664.00	.445857-02
288.00	.955815-01	672.00	.417707-02
296.00	.895470-01	680.00	.391336-02
304.00	.838934-01	688.00	.366629-02
312.00	.785968-01	696.00	.343482-02
320.00	.736346-01	704.00	.321796-02
328.00	.689857-01	712.00	.301479-02
336.00	.646303-01	720.00	.282445-02
344.00	.605499-01	728.00	.264613-02
352.00	.567271-01	736.00	.247907-02
360.00	.531456-01	744.00	.232255-02
368.00	.497902-01	752.00	.217592-02
376.00	.466467-01	760.00	.203854-02

768.00	.190984-02	1224.00	.464076-04
776.00	.178926-02	1232.00	.434776-04
784.00	.167630-02	1240.00	.407327-04
792.00	.157046-02	1248.00	.381610-04
800.00	.147131-02	1256.00	.357517-04
808.00	.137842-02	1264.00	.334945-04
816.00	.129139-02	1272.00	.313799-04
824.00	.120986-02	1280.00	.293987-04
832.00	.113348-02	1288.00	.275426-04
840.00	.106192-02	1296.00	.258037-04
848.00	.994872-03	1304.00	.241746-04
856.00	.932061-03	1312.00	.226483-04
864.00	.873216-03	1320.00	.212184-04
872.00	.818085-03	1328.00	.198788-04
880.00	.766435-03	1336.00	.186238-04
888.00	.718047-03	1344.00	.174479-04
896.00	.672713-03	1352.00	.163464-04
904.00	.630241-03	1360.00	.153143-04
912.00	.590451-03	1368.00	.143475-04
920.00	.553173-03	1376.00	.134416-04
928.00	.518248-03	1384.00	.125930-04
936.00	.485529-03	1392.00	.117980-04
944.00	.454875-03	1400.00	.110531-04
952.00	.426156-03	1408.00	.103553-04
960.00	.399251-03	1416.00	.970148-05
968.00	.374044-03	1424.00	.908898-05
976.00	.350429-03	1432.00	.851515-05
984.00	.328305-03	1440.00	.797754-05
992.00	.307577-03		
1000.00	.288158-03		
1008.00	.269966-03		
1016.00	.252921-03		
1024.00	.236953-03		
1032.00	.221993-03		
1040.00	.207978-03		
1048.00	.194847-03		
1056.00	.182545-03		
1064.00	.171020-03		
1072.00	.160223-03		
1080.00	.150107-03		
1088.00	.140630-03		
1096.00	.131752-03		
1104.00	.123433-03		
1112.00	.115640-03		
1120.00	.108340-03		
1128.00	.101499-03		
1136.00	.950914-04		
1144.00	.890878-04		
1152.00	.834633-04		
1160.00	.781938-04		
1168.00	.732570-04		
1176.00	.686320-04		
1184.00	.642989-04		
1192.00	.602394-04		
1200.00	.564362-04		
1208.00	.528731-04		
1216.00	.495349-04		

Bromine - 80

T 1/2 = 18 min

Br⁸⁰

A = .038500

ΔT = 2.00 min

T_{max} = 240 min

T	F	T	F
0.00	.100000+01	100.00	.212797-01
2.00	.925890	102.00	.197027-01
4.00	.857272	104.00	.182425-01
6.00	.793739	106.00	.168906-01
8.00	.734915	108.00	.156388-01
10.00	.680451	110.00	.144798-01
12.00	.630022	112.00	.134067-01
14.00	.583331	114.00	.124131-01
16.00	.540100	116.00	.114932-01
18.00	.500074	118.00	.106414-01
20.00	.463013	120.00	.985280-02
22.00	.428699	122.00	.912260-02
24.00	.396928	124.00	.844653-02
26.00	.367512	126.00	.782055-02
28.00	.340275	128.00	.724097-02
30.00	.315057	130.00	.670434-02
32.00	.291709	132.00	.620748-02
34.00	.270090	134.00	.574744-02
36.00	.250074	136.00	.532150-02
38.00	.231541	138.00	.492712-02
40.00	.214381	140.00	.456197-02
42.00	.198493	142.00	.422388-02
44.00	.183783	144.00	.391085-02
46.00	.170163	146.00	.362102-02
48.00	.157552	148.00	.335266-02
50.00	.145876	150.00	.310420-02
52.00	.135065	152.00	.287414-02
54.00	.125055	154.00	.266114-02
56.00	.115787	156.00	.246392-02
58.00	.107206	158.00	.228132-02
60.00	.992612-01	160.00	.211225-02
62.00	.919050-01	162.00	.195571-02
64.00	.850939-01	164.00	.181078-02
66.00	.787876-01	166.00	.167658-02
68.00	.729486-01	168.00	.155233-02
70.00	.675424-01	170.00	.143728-02
72.00	.625368-01	172.00	.133077-02
74.00	.579022-01	174.00	.123214-02
76.00	.536110-01	176.00	.114083-02
78.00	.496379-01	178.00	.105628-02
80.00	.459593-01	180.00	.978001-03
82.00	.425532-01	182.00	.905521-03
84.00	.393996-01	184.00	.838413-03
86.00	.364797-01	186.00	.776278-03
88.00	.337762-01	188.00	.718748-03
90.00	.312730-01	190.00	.665481-03
92.00	.289554-01	192.00	.616162-03
94.00	.268095-01	194.00	.570498-03
96.00	.248226-01	196.00	.528219-03
98.00	.229830-01	198.00	.489072-03

200.00	.452827-03
202.00	.419268-03
204.00	.388196-03
206.00	.359427-03
208.00	.332790-03
210.00	.308126-03
212.00	.285291-03
214.00	.264148-03
216.00	.244572-03
218.00	.226447-03
220.00	.209665-03
222.00	.194127-03
224.00	.179740-03
226.00	.166419-03
228.00	.154086-03
230.00	.142667-03
232.00	.132094-03
234.00	.122304-03
236.00	.113240-03
238.00	.104848-03
240.00	.970776-04

Bromine - 82

T 1/2 = 36. hr

Br⁸²

A = .01925

ΔT = 0.50 hr

T_{max} = 100.00 hr

T

F

T

F

0.00	.100000+01
0.50	.990421
1.00	.980934
1.50	.971538
2.00	.962232
2.50	.953015
3.00	.943886
3.50	.934845
4.00	.925890
4.50	.917021
5.00	.908237
5.50	.899537
6.00	.890920
6.50	.882387
7.00	.873934
7.50	.865563
8.00	.857272
8.50	.849060
9.00	.840927
9.50	.832872
10.00	.824894
10.50	.816993
11.00	.809167
11.50	.801416
12.00	.793739
12.50	.786136
13.00	.778606
13.50	.771148
14.00	.763761
14.50	.756445
15.00	.749199
15.50	.742023
16.00	.734915
16.50	.727876
17.00	.720903
17.50	.713998
18.00	.707159
18.50	.700385
19.00	.693676
19.50	.687032
20.00	.680451
20.50	.673933
21.00	.667477
21.50	.661084
22.00	.654751
22.50	.648479
23.00	.642268
23.50	.636116

24.00	.630022
24.50	.623987
25.00	.618010
25.50	.612091
26.00	.606227
26.50	.600420
27.00	.594669
27.50	.588973
28.00	.583331
28.50	.577744
29.00	.572209
29.50	.566728
30.00	.561300
30.50	.555923
31.00	.550598
31.50	.545324
32.00	.540100
32.50	.534927
33.00	.529803
33.50	.524728
34.00	.519702
34.50	.514724
35.00	.509793
35.50	.504910
36.00	.500074
36.50	.495283
37.00	.490539
37.50	.485840
38.00	.481187
38.50	.476577
39.00	.472012
39.50	.467491
40.00	.463013
40.50	.458578
41.00	.454185
41.50	.449835
42.00	.445526
42.50	.441258
43.00	.437031
43.50	.432845
44.00	.428699
44.50	.424593
45.00	.420525
45.50	.416497
46.00	.412508
46.50	.408556
47.00	.404643
47.50	.400767

48.00	.396928	75.50	.233780
48.50	.393126	76.00	.231541
49.00	.389360	76.50	.229323
49.50	.385631	77.00	.227126
50.00	.381937	77.50	.224950
50.50	.378278	78.00	.222796
51.00	.374655	78.50	.220662
51.50	.371066	79.00	.218548
52.00	.367512	79.50	.216454
52.50	.363991	80.00	.214381
53.00	.360505	80.50	.212328
53.50	.357052	81.00	.210294
54.00	.353631	81.50	.208279
54.50	.350244	82.00	.206284
55.00	.346889	82.50	.204308
55.50	.343566	83.00	.202351
56.00	.340275	83.50	.200413
56.50	.337016	84.00	.198493
57.00	.333788	84.50	.196592
57.50	.330590	85.00	.194709
58.00	.327424	85.50	.192844
58.50	.324287	86.00	.190996
59.00	.321181	86.50	.189167
59.50	.318105	87.00	.187355
60.00	.315057	87.50	.185560
60.50	.312040	88.00	.183783
61.00	.309051	88.50	.182022
61.50	.306090	89.00	.180279
62.00	.303158	89.50	.178552
62.50	.300254	90.00	.176842
63.00	.297378	90.50	.175148
63.50	.294530	91.00	.173470
64.00	.291708	91.50	.171808
64.50	.288914	92.00	.170163
65.00	.286147	92.50	.168533
65.50	.283406	93.00	.166918
66.00	.280691	93.50	.165319
66.50	.278002	94.00	.163736
67.00	.275340	94.50	.162168
67.50	.272702	95.00	.160614
68.00	.270090	95.50	.159076
68.50	.267503	96.00	.157552
69.00	.264940	96.50	.156043
69.50	.262403	97.00	.154548
70.00	.259889	97.50	.153068
70.50	.257400	98.00	.151601
71.00	.254934	98.50	.150149
71.50	.252492	99.00	.148711
72.00	.250074	99.50	.147287
72.50	.247678	100.00	.145876
73.00	.245306		
73.50	.242956		
74.00	.240629		
74.50	.238324		
75.00	.236041		

Cadmium - 107

T 1/2 = 6.7 hr

Cd¹⁰⁷

A = .103400

AT = .50 hr

T_{max} = 100.00 hr

T

F

T

F

0.00	.100000+01	23.00	.927173-01
0.50	.949614	23.50	.880456-01
1.00	.901766	24.00	.836093-01
1.50	.856329	24.50	.793966-01
2.00	.813182	25.00	.753961-01
2.50	.772209	25.50	.715971-01
3.00	.733300	26.00	.679896-01
3.50	.696352	26.50	.645639-01
4.00	.661265	27.00	.613108-01
4.50	.627947	27.50	.582215-01
5.00	.596307	28.00	.552880-01
5.50	.566261	28.50	.525022-01
6.00	.537729	29.00	.498568-01
6.50	.510635	29.50	.473447-01
7.00	.484906	30.00	.449592-01
7.50	.460473	30.50	.426939-01
8.00	.437272	31.00	.405427-01
8.50	.415239	31.50	.384999-01
9.00	.394317	32.00	.365600-01
9.50	.374449	32.50	.347179-01
10.00	.355582	33.00	.329686-01
10.50	.337665	33.50	.313074-01
11.00	.320652	34.00	.297300-01
11.50	.304495	34.50	.282320-01
12.00	.289153	35.00	.268095-01
12.50	.274583	35.50	.254586-01
13.00	.260748	36.00	.241759-01
13.50	.247610	36.50	.229577-01
14.00	.235134	37.00	.218010-01
14.50	.223286	37.50	.207025-01
15.00	.212035	38.00	.196594-01
15.50	.201352	38.50	.186688-01
16.00	.191207	39.00	.177282-01
16.50	.181572	39.50	.168349-01
17.00	.172424	40.00	.159867-01
17.50	.163735	40.50	.151812-01
18.00	.155486	41.00	.144162-01
18.50	.147652	41.50	.136899-01
19.00	.140212	42.00	.130001-01
19.50	.133147	42.50	.123450-01
20.00	.126438	43.00	.117230-01
20.50	.120068	43.50	.111323-01
20.50	.120068	44.00	.105714-01
21.00	.114018	44.50	.100388-01
21.50	.108273	45.00	.953296-02
22.00	.102817	45.50	.905263-02
22.50	.976369-01	46.00	.859650-02

46.50	.816335-02	74.50	.451335-03
47.00	.775203-02	75.00	.428594-03
47.50	.736144-02	75.50	.406999-03
48.00	.699052-02	76.00	.386492-03
48.50	.663830-02	76.50	.367018-03
49.00	.630382-02	77.00	.348525-03
49.50	.598619-02	77.50	.330964-03
50.00	.568457-02	78.00	.314288-03
50.50	.539814-02	78.50	.298452-03
51.00	.512615-02	79.00	.283414-03
51.50	.486786-02	79.50	.269134-03
52.00	.462259-02	80.00	.255574-03
52.50	.438967-02	80.50	.242696-03
53.00	.416850-02	81.00	.230468-03
53.50	.395846-02	81.50	.218855-03
54.00	.375901-02	82.00	.207828-03
54.50	.356961-02	82.50	.197356-03
55.00	.338975-02	83.00	.187412-03
55.50	.321895-02	83.50	.177969-03
56.00	.305676-02	84.00	.169002-03
56.50	.290274-02	84.50	.160487-03
57.00	.275648-02	85.00	.152400-03
57.50	.261759-02	85.50	.144721-03
58.00	.248570-02	86.00	.137429-03
58.50	.236046-02	86.50	.130505-03
59.00	.224152-02	87.00	.123929-03
59.50	.212858-02	87.50	.117685-03
60.00	.202133-02	88.00	.111755-03
60.50	.191948-02	88.50	.106124-03
61.00	.182277-02	89.00	.100777-03
61.50	.173092-02	89.50	.956993-04
62.00	.164371-02	90.00	.908773-04
62.50	.156089-02	90.50	.862984-04
63.00	.148224-02	91.00	.819501-04
63.50	.140756-02	91.50	.778209-04
64.00	.133663-02	92.00	.738998-04
64.50	.126929-02	92.50	.701763-04
65.00	.120533-02	93.00	.666404-04
65.50	.114460-02	93.50	.632826-04
66.00	.108693-02	94.00	.600940-04
66.50	.103216-02	94.50	.570661-04
67.00	.980155-03	95.00	.541908-04
67.50	.930768-03	95.50	.514603-04
68.00	.883870-03	96.00	.488674-04
68.50	.839335-03	96.50	.464052-04
69.00	.797044-03	97.00	.440670-04
69.50	.756884-03	97.50	.418466-04
70.00	.718748-03	98.00	.397381-04
70.50	.682533-03	98.50	.377358-04
71.00	.648142-03	99.00	.358345-04
71.50	.615485-03	99.50	.340289-04
72.00	.584473-03	100.00	.323143-04
72.50	.555024-03		
73.00	.527058-03		
73.50	.500501-03		
74.00	.475283-03		

Carbon - 11

T 1/2 = 20.5 min

C¹¹

A = .03380

ΔT = 2 min

T_{max} = 240 min

T	F	T	F
0.00	.100000+01	96.00	.389764-01
2.00	.934634	98.00	.364286-01
4.00	.873541	100.00	.340474-01
6.00	.816442	102.00	.318219-01
8.00	.763074	104.00	.297418-01
10.00	.713195	106.00	.277977-01
12.00	.666577	108.00	.259807-01
14.00	.623005	110.00	.242825-01
16.00	.582282	112.00	.226952-01
18.00	.544221	114.00	.212117-01
20.00	.508648	116.00	.198252-01
22.00	.475399	118.00	.185293-01
24.00	.444325	120.00	.173181-01
26.00	.415281	122.00	.161861-01
28.00	.388136	124.00	.151281-01
30.00	.362765	126.00	.141393-01
32.00	.339053	128.00	.132150-01
34.00	.316890	130.00	.123512-01
36.00	.296176	132.00	.115439-01
38.00	.276817	134.00	.107893-01
40.00	.258722	136.00	.100840-01
42.00	.241811	138.00	.942490-02
44.00	.226005	140.00	.880883-02
46.00	.211232	142.00	.823304-02
48.00	.197424	144.00	.769488-02
50.00	.184520	146.00	.719190-02
52.00	.172458	148.00	.672179-02
54.00	.161185	150.00	.628242-02
56.00	.150649	152.00	.587176-02
58.00	.140802	154.00	.548795-02
60.00	.131598	156.00	.512923-02
62.00	.122996	158.00	.479395-02
64.00	.114957	160.00	.448059-02
66.00	.107442	162.00	.418771-02
68.00	.100419	164.00	.391398-02
70.00	.938554-01	166.00	.365814-02
72.00	.877205-01	168.00	.341902-02
74.00	.819866-01	170.00	.319554-02
76.00	.766274-01	172.00	.298666-02
78.00	.716186-01	174.00	.279143-02
80.00	.669372-01	176.00	.260897-02
82.00	.625618-01	178.00	.243844-02
84.00	.584724-01	180.00	.227904-02
86.00	.546503-01	182.00	.213007-02
88.00	.510781-01	184.00	.199084-02
90.00	.477393-01	186.00	.186070-02
92.00	.446188-01	188.00	.173908-02
94.00	.417023-01	190.00	.162540-02

192.00	.151916-02
194.00	.141985-02
196.00	.132705-02
198.00	.124030-02
200.00	.115923-02
202.00	.108345-02
204.00	.101263-02
206.00	.946443-03
208.00	.884578-03
210.00	.826757-03
212.00	.772715-03
214.00	.722206-03
216.00	.674998-03
218.00	.630877-03
220.00	.589639-03
222.00	.551097-03
224.00	.515074-03
226.00	.481406-03
228.00	.449938-03
230.00	.420528-03
232.00	.393040-03
234.00	.367348-03
236.00	.343336-03
238.00	.320894-03
240.00	.299918-03

Cl³⁴

Chlorine - 34

T 1/2 = 33 min

A = 0.21000

ΔT = 4.00 min

T_{max} = 840.00 min

T	F	T	F
0.00	.100000+01	200.00	.149956-01
4.00	.919431	204.00	.137874-01
8.00	.845354	208.00	.126766-01
12.00	.777245	212.00	.116552-01
16.00	.714623	216.00	.107162-01
20.00	.657047	220.00	.985280-02
24.00	.604109	224.00	.905897-02
28.00	.555437	228.00	.832910-02
32.00	.510686	232.00	.765803-02
36.00	.469541	236.00	.704104-02
40.00	.431710	240.00	.647375-02
44.00	.396928	244.00	.595217-02
48.00	.364948	248.00	.547261-02
52.00	.335545	252.00	.503169-02
56.00	.308510	256.00	.462629-02
60.00	.283654	260.00	.425356-02
64.00	.260800	264.00	.391085-02
68.00	.239788	268.00	.359576-02
72.00	.220469	272.00	.330605-02
76.00	.202706	276.00	.303969-02
80.00	.186374	280.00	.279478-02
84.00	.171358	284.00	.256961-02
88.00	.157552	288.00	.236258-02
92.00	.144858	292.00	.217223-02
96.00	.133187	296.00	.199722-02
100.00	.122456	300.00	.183630-02
104.00	.112590	304.00	.168836-02
108.00	.103519	308.00	.155233-02
112.00	.951786-01	312.00	.142726-02
116.00	.875102-01	316.00	.131227-02
120.00	.804596-01	320.00	.120654-02
124.00	.739771-01	324.00	.110933-02
128.00	.680168-01	328.00	.101995-02
132.00	.625368-01	332.00	.937775-03
136.00	.574983-01	336.00	.862220-03
140.00	.528657-01	340.00	.792752-03
144.00	.486064-01	344.00	.728881-03
148.00	.446902-01	348.00	.670156-03
152.00	.410896-01	352.00	.616162-03
156.00	.377791-01	356.00	.566519-03
160.00	.347353-01	360.00	.520875-03
164.00	.319367-01	364.00	.478909-03
168.00	.293636-01	368.00	.440324-03
172.00	.269978-01	372.00	.404847-03
176.00	.248226-01	376.00	.372229-03
180.00	.228227-01	380.00	.342239-03
184.00	.209839-01	384.00	.314666-03
188.00	.192932-01	388.00	.289313-03
192.00	.177388-01	392.00	.266004-03
196.00	.163096-01	396.00	.244572-03

400.00	.224867-03	620.00	.221557-05
404.00	.206750-03	624.00	.203706-05
408.00	.190092-03	628.00	.187294-05
412.00	.174777-03	632.00	.172204-05
416.00	.160695-03	636.00	.158330-05
420.00	.147748-03	640.00	.145573-05
424.00	.135844-03	644.00	.133845-05
428.00	.124900-03	648.00	.123061-05
432.00	.114837-03	652.00	.113146-05
436.00	.105584-03	656.00	.104030-05
440.00	.970776-04	660.00	.956486-06
444.00	.892562-04	664.00	.879423-06
448.00	.820649-04	668.00	.808569-06
452.00	.754530-04	672.00	.743423-06
456.00	.693739-04	676.00	.683527-06
460.00	.637845-04	680.00	.628456-06
464.00	.586455-04	684.00	.577822-06
468.00	.539205-04	688.00	.531268-06
472.00	.495762-04	692.00	.488464-06
476.00	.455819-04	696.00	.449109-06
480.00	.419094-04	700.00	.412925-06
484.00	.385328-04	704.00	.379656-06
488.00	.354283-04	708.00	.349068-06
492.00	.325739-04	712.00	.320944-06
496.00	.299494-04	716.00	.295086-06
500.00	.275364-04	720.00	.271311-06
504.00	.253179-04	724.00	.249452-06
508.00	.232780-04	728.00	.229354-06
512.00	.214026-04	732.00	.210875-06
516.00	.196782-04	736.00	.193885-06
520.00	.180927-04	740.00	.178264-06
524.00	.166350-04	744.00	.163901-06
528.00	.152948-04	748.00	.150696-06
532.00	.140625-04	752.00	.138555-06
536.00	.129295-04	756.00	.127392-06
540.00	.118878-04	760.00	.117128-06
544.00	.109300-04	764.00	.107691-06
548.00	.100494-04	768.00	.990144-07
552.00	.923971-05	772.00	.910370-07
556.00	.849528-05	776.00	.837022-07
560.00	.781082-05	780.00	.769585-07
564.00	.718152-05	784.00	.707580-07
568.00	.660291-05	788.00	.650571-07
572.00	.607092-05	792.00	.598156-07
576.00	.558180-05	796.00	.549963-07
580.00	.513208-05	800.00	.505653-07
584.00	.471859-05	804.00	.464913-07
588.00	.433842-05	808.00	.427456-07
592.00	.398888-05	812.00	.393016-07
596.00	.366750-05	816.00	.361351-07
600.00	.337201-05	820.00	.332238-07
604.00	.310034-05	824.00	.305470-07
608.00	.285055-05	828.00	.280858-07
612.00	.262088-05	832.00	.258230-07
616.00	.240972-05	836.00	.237425-07
		840.00	.218296-07

Chlorine - 38

T 1/2 = 37.3 min

Cl³⁸

A = .018580

ΔT = 4.00 min

T_{max} = 820.00 min

T	F	T	F
0.00	.100000*01	192.00	.282303-01
4.00	.928375	196.00	.262083-01
8.00	.861879	200.00	.243311-01
12.00	.800147	204.00	.225884-01
16.00	.742836	208.00	.209705-01
20.00	.689630	212.00	.194684-01
24.00	.640235	216.00	.180740-01
28.00	.594378	220.00	.167795-01
32.00	.551805	224.00	.155776-01
36.00	.512282	228.00	.144619-01
40.00	.475590	232.00	.134260-01
44.00	.441525	236.00	.124644-01
48.00	.409901	240.00	.115716-01
52.00	.380541	244.00	.107428-01
56.00	.353285	248.00	.997334-02
60.00	.327981	252.00	.925899-02
64.00	.304489	256.00	.859581-02
68.00	.282680	260.00	.798013-02
72.00	.262433	264.00	.740855-02
76.00	.243636	268.00	.687791-02
80.00	.226185	272.00	.638528-02
84.00	.209985	276.00	.592793-02
88.00	.194945	280.00	.550334-02
92.00	.180982	284.00	.510016-02
96.00	.158019	288.00	.474321-02
100.00	.155984	292.00	.440348-02
104.00	.144812	296.00	.408808-02
108.00	.134440	300.00	.379527-02
112.00	.124810	304.00	.352343-02
116.00	.115871	308.00	.327106-02
120.00	.107571	312.00	.303677-02
124.00	.998666-01	316.00	.281926-02
128.00	.927136-01	320.00	.261733-02
132.00	.860730-01	324.00	.242986-02
136.00	.799079-01	328.00	.225582-02
140.00	.741845-01	332.00	.209425-02
144.00	.688710-01	336.00	.194425-02
148.00	.639381-01	340.00	.180499-02
152.00	.593585-01	344.00	.167571-02
156.00	.551069-01	348.00	.155568-02
160.00	.511599-01	352.00	.144426-02
164.00	.474955-01	356.00	.134081-02
168.00	.440936-01	360.00	.124478-02
172.00	.409354-01	364.00	.115562-02
176.00	.380034-01	368.00	.107285-02
180.00	.352814-01	372.00	.996003-03
184.00	.327543-01	376.00	.924664-03
188.00	.304083-01	380.00	.858435-03

384.00	.706949-03	604.00	.133724-04
388.00	.739867-03	608.00	.124146-04
392.00	.686874-03	612.00	.115254-04
396.00	.637676-03	616.00	.106998-04
400.00	.592002-03	620.00	.993346-05
404.00	.549600-03	624.00	.922199-05
408.00	.510235-03	628.00	.856146-05
412.00	.473689-03	632.00	.794824-05
416.00	.439761-03	636.00	.737894-05
420.00	.408263-03	640.00	.685042-05
424.00	.379021-03	644.00	.635976-05
428.00	.351873-03	648.00	.590424-05
432.00	.326670-03	652.00	.548134-05
436.00	.303272-03	656.00	.508874-05
440.00	.281550-03	660.00	.472426-05
444.00	.261384-03	664.00	.438588-05
448.00	.242662-03	668.00	.407174-05
452.00	.225281-03	672.00	.378010-05
456.00	.209146-03	676.00	.350935-05
460.00	.194165-03	680.00	.325799-05
464.00	.180258-03	684.00	.302463-05
468.00	.167347-03	688.00	.280799-05
472.00	.155361-03	692.00	.260687-05
476.00	.144233-03	696.00	.242015-05
480.00	.133902-03	700.00	.224681-05
484.00	.124311-03	704.00	.208588-05
488.00	.115408-03	708.00	.193648-05
492.00	.107141-03	712.00	.179778-05
496.00	.994675-04	716.00	.166901-05
500.00	.923431-04	720.00	.154947-05
504.00	.857289-04	724.00	.143848-05
508.00	.795886-04	728.00	.133545-05
512.00	.738880-04	732.00	.123980-05
516.00	.685957-04	736.00	.115100-05
520.00	.636825-04	740.00	.106856-05
524.00	.592213-04	744.00	.992022-06
528.00	.548867-04	748.00	.920968-06
532.00	.509554-04	752.00	.855004-06
536.00	.473057-04	756.00	.793764-06
540.00	.439174-04	760.00	.736910-06
544.00	.407718-04	764.00	.684128-06
548.00	.378515-04	768.00	.635127-06
552.00	.351404-04	772.00	.589636-06
556.00	.326234-04	776.00	.547403-06
560.00	.302868-04	780.00	.508195-06
564.00	.281175-04	784.00	.471796-06
568.00	.261035-04	788.00	.438003-06
572.00	.242338-04	792.00	.406631-06
576.00	.224981-04	796.00	.377506-06
580.00	.208867-04	800.00	.350467-06
584.00	.193906-04	804.00	.325364-06
588.00	.180018-04	808.00	.302060-06
592.00	.167124-04	812.00	.280425-06
596.00	.155154-04	816.00	.260339-06
600.00	.144041-04	820.00	.241692-06

Cobalt - 60 M

T 1/2 = 10.5 min

Co⁶⁰ M

A = .06600

AT = 2.00 min

T_{max} = 120.00 min

T

F

T

F

0.00	.100000+01	94.00	.202133-02
2.00	.876341	96.00	.177137-02
4.00	.767974	98.00	.155233-02
6.00	.673007	100.00	.136037-02
8.00	.589783	102.00	.119215-02
10.00	.516851	104.00	.104473-02
12.00	.452938	106.00	.915537-03
14.00	.396928	108.00	.802322-03
16.00	.347844	110.00	.703108-03
18.00	.304830	112.00	.616162-03
20.00	.267135	114.00	.539968-03
22.00	.234102	116.00	.473196-03
24.00	.205153	118.00	.414681-03
26.00	.179784	120.00	.363402-03
28.00	.157552		
30.00	.138069		
32.00	.120996		
34.00	.106034		
36.00	.929215-01		
38.00	.814309-01		
40.00	.713613-01		
42.00	.625368-01		
44.00	.548036-01		
46.00	.480266-01		
48.00	.420877-01		
50.00	.368832-01		
52.00	.323222-01		
54.00	.283253-01		
56.00	.248226-01		
58.00	.217531-01		
60.00	.190631-01		
62.00	.167058-01		
64.00	.146400-01		
66.00	.128296-01		
68.00	.112431-01		
70.00	.985280-02		
72.00	.863441-02		
74.00	.756669-02		
76.00	.663100-02		
78.00	.581102-02		
80.00	.509243-02		
82.00	.446271-02		
84.00	.391085-02		
86.00	.342724-02		
88.00	.300343-02		
90.00	.263203-02		
92.00	.230656-02		

Copper - 66

T 1/2 = 5.1 min

Cu⁶⁶

A = .13590

ΔT = .50 min

T_{max} = 60.00 min

T

F

T

F

0.00	.100000+01	24.00	.383270-01
0.50	.934307	24.50	.358092-01
1.00	.872930	25.00	.334568-01
1.50	.815585	25.50	.312589-01
2.00	.762007	26.00	.292054-01
2.50	.711948	26.50	.272869-01
3.00	.665178	27.00	.254943-01
3.50	.621481	27.50	.238195-01
4.00	.580654	28.00	.222547-01
4.50	.542509	28.50	.207928-01
5.00	.506870	29.00	.194268-01
5.50	.473573	29.50	.181506-01
6.00	.442462	30.00	.169583-01
6.50	.413396	30.50	.158442-01
7.00	.386239	31.00	.148034-01
7.50	.360865	31.50	.138309-01
8.00	.337159	32.00	.129223-01
8.50	.315010	32.50	.120734-01
9.00	.294316	33.00	.112803-01
9.50	.274982	33.50	.105392-01
10.00	.256917	34.00	.984689-02
10.50	.240040	34.50	.920002-02
11.00	.224271	35.00	.859564-02
11.50	.209538	35.50	.803097-02
12.00	.195773	36.00	.750339-02
12.50	.182912	36.50	.701047-02
13.00	.170896	37.00	.654994-02
13.50	.159669	37.50	.611965-02
14.00	.149180	38.00	.571763-02
14.50	.139380	38.50	.534203-02
15.00	.130224	39.00	.499109-02
15.50	.121669	39.50	.466322-02
16.00	.113676	40.00	.435688-02
16.50	.106209	40.50	.407066-02
17.00	.992315-01	41.00	.380325-02
17.50	.927127-01	41.50	.355340-02
18.00	.866221-01	42.00	.331997-02
18.50	.809317-01	42.50	.310187-02
19.00	.756150-01	43.00	.289810-02
19.50	.706477-01	43.50	.270771-02
20.00	.660066-01	44.00	.252984-02
20.50	.616705-01	44.50	.236365-02
21.00	.576192-01	45.00	.220837-02
21.50	.538340-01	45.50	.206330-02
22.00	.502975-01	46.00	.192775-02
22.50	.469933-01	46.50	.180111-02
23.00	.439062-01	47.00	.168279-02
23.50	.410219-01	47.50	.157225-02

48.00	.146896-02
48.50	.137246-02
49.00	.128230-02
49.50	.119806-02
50.00	.111936-02
50.50	.104582-02
51.00	.977121-03
51.50	.912931-03
52.00	.852958-03
52.50	.796925-03
53.00	.744573-03
53.50	.695660-03
54.00	.649960-03
54.50	.607262-03
55.00	.567369-03
55.50	.530097-03
56.00	.495274-03
56.50	.462738-03
57.00	.432339-03
57.50	.403938-03
58.00	.377402-03
58.50	.352609-03
59.00	.329445-03
59.50	.307803-03
60.00	.287583-03

Fluorine - 18

T 1/2 = 112 min

F¹⁸

A = .006187 AT = 5 min

T_{max} = 480 min

T	F	T	F
0.00	.100000 -01	240.00	.226529
5.00	.969539	245.00	.219629
10.00	.940005	250.00	.212939
15.00	.911371	255.00	.206452
20.00	.883609	260.00	.200163
25.00	.856693	265.00	.194066
30.00	.830597	270.00	.188155
35.00	.805296	275.00	.182423
40.00	.780766	280.00	.176866
45.00	.756983	285.00	.171479
50.00	.733924	290.00	.166255
55.00	.711567	295.00	.161191
60.00	.689892	300.00	.156281
65.00	.668877	305.00	.151520
70.00	.648502	310.00	.146905
75.00	.628748	315.00	.142430
80.00	.609595	320.00	.138091
85.00	.591026	325.00	.133885
90.00	.573023	330.00	.129806
95.00	.555568	335.00	.125852
100.00	.538644	340.00	.122019
105.00	.522236	345.00	.118302
110.00	.506328	350.00	.114698
115.00	.490905	355.00	.111204
120.00	.475951	360.00	.107817
125.00	.461453	365.00	.104533
130.00	.447396	370.00	.101348
135.00	.433768	375.00	.982613-01
140.00	.420555	380.00	.952681-01
145.00	.407744	385.00	.923661-01
150.00	.395324	390.00	.895525-01
155.00	.383282	395.00	.868246-01
160.00	.371606	400.00	.841798-01
165.00	.360287	405.00	.816156-01
170.00	.349312	410.00	.791295-01
175.00	.338671	415.00	.767191-01
180.00	.328355	420.00	.743821-01
185.00	.318353	425.00	.721163-01
190.00	.308655	430.00	.699195-01
195.00	.299253	435.00	.677897-01
200.00	.290138	440.00	.657247-01
205.00	.281300	445.00	.637227-01
210.00	.272731	450.00	.617816-01
215.00	.264423	455.00	.598996-01
220.00	.256368	460.00	.580750-01
225.00	.248559	465.00	.563059-01
230.00	.240987	470.00	.545908-01
235.00	.233647	475.00	.529279-01
		480.00	.513156-01

Gallium - 70

T 1/2 = 21 min

Ga⁷⁰

A = .033000

AT = 2.00 min

T_{max} = 120.00 min

T

F

T

F

0.00	.100000+01	90.00	.513033-01
2.00	.936131	92.00	.480266-01
4.00	.876341	94.00	.449592-01
6.00	.820370	96.00	.420877-01
8.00	.767973	98.00	.393996-01
10.00	.718924	100.00	.368832-01
12.00	.673007	102.00	.345275-01
14.00	.630022	104.00	.323222-01
16.00	.589783	106.00	.302578-01
18.00	.552114	108.00	.283253-01
20.00	.516851	110.00	.265162-01
22.00	.483840	112.00	.248226-01
24.00	.452938	114.00	.232372-01
26.00	.424009	116.00	.217531-01
28.00	.396928	118.00	.203637-01
30.00	.371577	120.00	.190631-01
32.00	.347844		
34.00	.325628		
36.00	.304830		
38.00	.285361		
40.00	.267135		
42.00	.250074		
44.00	.234102		
46.00	.219150		
48.00	.205153		
50.00	.192050		
52.00	.179784		
54.00	.168301		
56.00	.157552		
58.00	.147489		
60.00	.138069		
62.00	.129251		
64.00	.120996		
66.00	.113268		
68.00	.106033		
70.00	.992612-01		
72.00	.929215-01		
74.00	.869867-01		
76.00	.814309-01		
78.00	.762300-01		
80.00	.713613-01		
82.00	.668035-01		
84.00	.625368-01		
86.00	.585426-01		
88.00	.548036-01		

Germanium -75

T 1/2 = 82 min

Ge⁷⁵

A = .008450

ΔT = 8.00 min

T_{max} = 1440.00 min

T	F	T	F
0.00	.100000+01	400.00	.340474-01
8.00	.934634	408.00	.318219-01
16.00	.873541	416.00	.297418-01
24.00	.816441	424.00	.277978-01
32.00	.763074	432.00	.259807-01
40.00	.713195	440.00	.242825-01
48.00	.666577	448.00	.226952-01
56.00	.623005	456.00	.212117-01
64.00	.582282	464.00	.198252-01
72.00	.544221	472.00	.185293-01
80.00	.508647	480.00	.173181-01
88.00	.475399	488.00	.161861-01
96.00	.444325	496.00	.151281-01
104.00	.415281	504.00	.141393-01
112.00	.388136	512.00	.132150-01
120.00	.362765	520.00	.123512-01
128.00	.339053	528.00	.115439-01
136.00	.316890	536.00	.107893-01
144.00	.296176	544.00	.100840-01
152.00	.276817	552.00	.942490-02
160.00	.258722	560.00	.880884-02
168.00	.241811	568.00	.823304-02
176.00	.226005	576.00	.769488-02
184.00	.211232	584.00	.719190-02
192.00	.197424	592.00	.672179-02
200.00	.184520	600.00	.628242-02
208.00	.172458	608.00	.587176-02
216.00	.161185	616.00	.548795-02
224.00	.150649	624.00	.512923-02
232.00	.140802	632.00	.479395-02
240.00	.131598	640.00	.448059-02
248.00	.122996	648.00	.418771-02
256.00	.114957	656.00	.391398-02
264.00	.107442	664.00	.365814-02
272.00	.100419	672.00	.341902-02
280.00	.938554-01	680.00	.319554-02
288.00	.877205-01	688.00	.298666-02
296.00	.819866-01	696.00	.279143-02
304.00	.766274-01	704.00	.260897-02
312.00	.716186-01	712.00	.243843-02
320.00	.669372-01	720.00	.227904-02
328.00	.625618-01	728.00	.213007-02
336.00	.584724-01	736.00	.199084-02
344.00	.546503-01	744.00	.186070-02
352.00	.510781-01	752.00	.173908-02
360.00	.477393-01	760.00	.162540-02
368.00	.446188-01	768.00	.151916-02
376.00	.417023-01	776.00	.141986-02
384.00	.389764-01	784.00	.132705-02
392.00	.364286-01	792.00	.124030-02

800.00	.115923-02	1256.00	.245893-04
808.00	.108345-02	1264.00	.229820-04
816.00	.101263-02	1272.00	.214798-04
824.00	.946443-03	1280.00	.200757-04
832.00	.884578-03	1288.00	.187634-04
840.00	.826757-03	1296.00	.175370-04
848.00	.772715-03	1304.00	.163906-04
856.00	.722206-03	1312.00	.153193-04
864.00	.674999-03	1320.00	.143179-04
872.00	.630877-03	1328.00	.133820-04
880.00	.589639-03	1336.00	.125073-04
888.00	.551097-03	1344.00	.116897-04
896.00	.515074-03	1352.00	.109256-04
904.00	.481406-03	1360.00	.102115-04
912.00	.449938-03	1368.00	.954398-05
920.00	.420528-03	1376.00	.892013-05
928.00	.393040-03	1384.00	.833705-05
936.00	.367348-03	1392.00	.779210-05
944.00	.343336-03	1400.00	.728276-05
952.00	.320894-03	1408.00	.680672-05
960.00	.299918-03	1416.00	.636179-05
968.00	.280314-03	1424.00	.594595-05
976.00	.261991-03	1432.00	.555729-05
984.00	.244866-03	1440.00	.519403-05
992.00	.228860-03		
1000.00	.213900-03		
1008.00	.199919-03		
1016.00	.186851-03		
1024.00	.174637-03		
1032.00	.163222-03		
1040.00	.152553-03		
1048.00	.142581-03		
1056.00	.133261-03		
1064.00	.124550-03		
1072.00	.116409-03		
1080.00	.108800-03		
1088.00	.101688-03		
1096.00	.950412-04		
1104.00	.888288-04		
1112.00	.830224-04		
1120.00	.775956-04		
1128.00	.725235-04		
1136.00	.677829-04		
1144.00	.633523-04		
1152.00	.592112-04		
1160.00	.553408-04		
1168.00	.517234-04		
1176.00	.483425-04		
1184.00	.451825-04		
1192.00	.422291-04		
1200.00	.394688-04		
1208.00	.368889-04		
1216.00	.344776-04		
1224.00	.322240-04		
1232.00	.301176-04		
1240.00	.281490-04		
1248.00	.263090-04		

Iodine - 128

T 1/2 = 25 min

I 128

A = .02772

ΔT = 2 min

T_{max} = 120 min

T

F

T

F

0.00	.100000+01	98.00	.661018-01
2.00	.946069	100.00	.625368-01
4.00	.895046	102.00	.591641-01
6.00	.846775	104.00	.559733-01
8.00	.801108	106.00	.529546-01
10.00	.757903	108.00	.500987-01
12.00	.717028	110.00	.473968-01
14.00	.678358	112.00	.448407-01
16.00	.641773	114.00	.424223-01
18.00	.607162	116.00	.401345-01
20.00	.574417	118.00	.379700-01
22.00	.543438	120.00	.359222-01
24.00	.514130		
26.00	.486402		
28.00	.460170		
30.00	.435352		
32.00	.411873		
34.00	.389660		
36.00	.368645		
38.00	.348764		
40.00	.329955		
42.00	.312160		
44.00	.295325		
46.00	.279397		
48.00	.264329		
50.00	.250074		
52.00	.236587		
54.00	.223827		
56.00	.211756		
58.00	.200336		
60.00	.189532		
62.00	.179310		
64.00	.169639		
66.00	.160491		
68.00	.151835		
70.00	.143646		
72.00	.135899		
74.00	.128570		
76.00	.121636		
78.00	.115076		
80.00	.108870		
82.00	.102999		
84.00	.974437-01		
86.00	.921885-01		
88.00	.872167-01		
90.00	.825130-01		
92.00	.780629-01		
94.00	.738529-01		
96.00	.698699-01		

Magnesium - 27

T 1/2 = 9.5 min

Mg²⁷

A = .072950

ΔT = 1.00 min

T_{max} = 120.00 min

T	F	T	F
0.00	.100000+01	48.00	.301491-01
1.00	.929647	49.00	.280280-01
2.00	.864244	50.00	.260562-01
3.00	.803442	51.00	.242231-01
4.00	.746918	52.00	.225189-01
5.00	.694370	53.00	.209346-01
6.00	.645519	54.00	.194618-01
7.00	.600105	55.00	.180926-01
8.00	.557886	56.00	.168198-01
9.00	.518638	57.00	.156365-01
10.00	.482150	58.00	.145364-01
11.00	.448229	59.00	.135137-01
12.00	.416695	60.00	.125630-01
13.00	.387380	61.00	.116791-01
14.00	.360126	62.00	.108575-01
15.00	.334791	63.00	.100936-01
16.00	.311237	64.00	.938352-02
17.00	.289341	65.00	.872337-02
18.00	.268985	66.00	.810965-02
19.00	.250061	67.00	.753912-02
20.00	.232469	68.00	.700872-02
21.00	.216114	69.00	.651564-02
22.00	.200910	70.00	.605725-02
23.00	.186775	71.00	.563110-02
24.00	.173635	72.00	.523494-02
25.00	.161419	73.00	.486665-02
26.00	.150063	74.00	.452427-02
27.00	.139506	75.00	.420597-02
28.00	.129691	76.00	.391007-02
29.00	.120567	77.00	.363499-02
30.00	.112085	78.00	.337925-02
31.00	.104199	79.00	.314151-02
32.00	.968686-01	80.00	.292050-02
33.00	.900536-01	81.00	.271504-02
34.00	.837181-01	82.00	.252403-02
35.00	.778283-01	83.00	.234645-02
36.00	.723529-01	84.00	.218137-02
37.00	.672627-01	85.00	.202791-02
38.00	.625305-01	86.00	.188524-02
39.00	.581314-01	87.00	.175261-02
40.00	.540417-01	88.00	.162931-02
41.00	.502397-01	89.00	.151468-02
42.00	.467052-01	90.00	.140812-02
43.00	.434193-01	91.00	.130905-02
44.00	.403647-01	92.00	.121696-02
45.00	.375249-01	93.00	.113134-02
46.00	.348849-01	94.00	.105175-02
47.00	.324307-01	95.00	.977756-03

96.00	.908969-03
97.00	.845020-03
98.00	.785571-03
99.00	.730304-03
100.00	.678925-03
101.00	.631161-03
102.00	.586757-03
103.00	.545477-03
104.00	.507101-03
105.00	.471425-03
106.00	.438259-03
107.00	.407426-03
108.00	.378763-03
109.00	.352116-03
110.00	.327344-03
111.00	.304314-03
112.00	.282905-03
113.00	.263002-03
114.00	.244499-03
115.00	.227293-03
116.00	.211307-03
117.00	.196441-03
118.00	.182621-03
119.00	.169773-03
120.00	.157829-03

Manganese - 56

T 1/2 = 2.58 hr

Mn⁵⁶

A = .268600

ΔT = .25 h

T_{max} = 48.00 h

T

F

T

F

0.00	.100000+01	12.00	.398274-01
0.25	.935055	12.25	.372408-01
0.50	.874328	12.50	.348222-01
0.75	.817544	12.75	.325607-01
1.00	.764449	13.00	.304460-01
1.25	.714802	13.25	.284687-01
1.50	.668379	13.50	.266198-01
1.75	.624971	13.75	.248910-01
2.00	.584382	14.00	.232744-01
2.25	.546429	14.25	.217629-01
2.50	.510942	14.50	.203495-01
2.75	.477758	14.75	.190279-01
3.00	.446730	15.00	.177921-01
3.25	.417717	15.25	.166366-01
3.50	.390589	15.50	.155561-01
3.75	.365222	15.75	.145458-01
4.00	.341503	16.00	.136012-01
4.25	.319324	16.25	.127178-01
4.50	.298585	16.50	.118919-01
4.75	.279193	16.75	.111196-01
5.00	.261061	17.00	.103974-01
5.25	.244107	17.25	.972213-02
5.50	.228253	17.50	.909073-02
5.75	.213429	17.75	.850033-02
6.00	.199568	18.00	.794828-02
6.25	.186607	18.25	.743208-02
6.50	.174488	18.50	.694940-02
6.75	.163156	18.75	.649807-02
7.00	.152560	19.00	.607605-02
7.25	.142652	19.25	.568144-02
7.50	.133387	19.50	.531246-02
7.75	.124724	19.75	.496744-02
8.00	.116624	20.00	.464483-02
8.25	.109050	20.25	.434317-02
8.50	.101968	20.50	.406111-02
8.75	.953453-01	20.75	.379736-02
9.00	.891531-01	21.00	.355074-02
9.25	.833631-01	21.25	.332013-02
9.50	.779490-01	21.50	.310451-02
9.75	.728866-01	21.75	.290289-02
10.00	.681530-01	22.00	.271436-02
10.25	.637268-01	22.25	.253807-02
10.50	.595881-01	22.50	.237324-02
10.75	.557181-01	22.75	.221911-02
11.00	.520995-01	23.00	.207499-02
11.25	.487159-01	23.25	.194023-02
11.50	.455520-01	23.50	.181423-02
11.75	.425936-01	23.75	.169639-02

24.00	.158622-02	38.75	.301824-04
24.25	.146320-02	39.00	.282222-04
24.50	.138688-02	39.25	.263893-04
24.75	.129681-02	39.50	.246755-04
25.00	.121259-02	39.75	.230729-04
25.25	.113383-02	40.00	.215745-04
25.50	.106020-02	40.25	.201733-04
25.75	.991343-03	40.50	.188632-04
26.00	.926960-03	40.75	.176381-04
26.25	.866759-03	41.00	.164926-04
26.50	.810467-03	41.25	.154215-04
26.75	.757831-03	41.50	.144199-04
27.00	.708614-03	41.75	.134834-04
27.25	.662593-03	42.00	.126077-04
27.50	.619561-03	42.25	.117889-04
27.75	.579323-03	42.50	.110233-04
28.00	.541699-03	42.75	.103074-04
28.25	.506518-03	43.00	.963797-05
28.50	.473622-03	43.25	.901203-05
28.75	.442863-03	43.50	.842674-05
29.00	.414101-03	43.75	.787947-05
29.25	.387207-03	44.00	.736774-05
29.50	.362060-03	44.25	.688924-05
29.75	.338546-03	44.50	.644182-05
30.00	.316559-03	44.75	.602345-05
30.25	.296000-03	45.00	.563226-05
30.50	.276777-03	45.25	.526647-05
30.75	.258801-03	45.50	.492444-05
31.00	.241993-03	45.75	.460462-05
31.25	.226277-03	46.00	.430557-05
31.50	.211582-03	46.25	.402595-05
31.75	.197840-03	46.50	.376448-05
32.00	.184992-03	46.75	.352000-05
32.25	.172977-03	47.00	.329139-05
32.50	.161743-03	47.25	.307763-05
32.75	.151239-03	47.50	.287775-05
33.00	.141417-03	47.75	.269086-05
33.25	.132232-03	48.00	.251610-05
33.50	.123644-03		
33.75	.115614-03		
34.00	.108106-03		
34.25	.101085-03		
34.50	.945199-04		
34.75	.883813-04		
35.00	.826414-04		
35.25	.772742-04		
35.50	.722556-04		
35.75	.675630-04		
36.00	.631751-04		
36.25	.590722-04		
36.50	.552358-04		
36.75	.516485-04		
37.00	.482941-04		
37.25	.451577-04		
37.50	.422249-04		
37.75	.394826-04		
38.00	.369184-04		
38.25	.345207-04		
38.50	.322788-04		

Nickel - 65

T 1/2 = 2.56 hr

Ni⁶⁵

A = 0.2707

ΔT = .25 hr

T_{max} = 24 hr

T	F	T	F
0.00	.100000+01	12.25	.361619-01
0.25	.934494	12.50	.337930-01
0.50	.873279	12.75	.315794-01
0.75	.816074	13.00	.295108-01
1.00	.762616	13.25	.275776-01
1.25	.712661	13.50	.257711-01
1.50	.665977	13.75	.240830-01
1.75	.622352	14.00	.225054-01
2.00	.581584	14.25	.210312-01
2.25	.543487	14.50	.196535-01
2.50	.507885	14.75	.183661-01
2.75	.474616	15.00	.171630-01
3.00	.443525	15.25	.160387-01
3.25	.414472	15.50	.149881-01
3.50	.387322	15.75	.140063-01
3.75	.361950	16.00	.130888-01
4.00	.338240	16.25	.122314-01
4.25	.316083	16.50	.114302-01
4.50	.295378	16.75	.106814-01
4.75	.276029	17.00	.998172-02
5.00	.257947	17.25	.932786-02
5.25	.241050	17.50	.871683-02
5.50	.225260	17.75	.814582-02
5.75	.210504	18.00	.761222-02
6.00	.196715	18.25	.711358-02
6.25	.183829	18.50	.664760-02
6.50	.171787	18.75	.621214-02
6.75	.160534	19.00	.580521-02
7.00	.150018	19.25	.542493-02
7.25	.140191	19.50	.506957-02
7.50	.131008	19.75	.473748-02
7.75	.122426	20.00	.442715-02
8.00	.114406	20.25	.413714-02
8.25	.106911	20.50	.386613-02
8.50	.999085-01	20.75	.361288-02
8.75	.933639-01	21.00	.337621-02
9.00	.872480-01	21.25	.315505-02
9.25	.815329-01	21.50	.294838-02
9.50	.761919-01	21.75	.275524-02
9.75	.712009-01	22.00	.257476-02
10.00	.665368-01	22.25	.240609-02
10.25	.621782-01	22.50	.224848-02
10.50	.581052-01	22.75	.210119-02
10.75	.542990-01	23.00	.196355-02
11.00	.507421-01	23.25	.183493-02
11.25	.474182-01	23.50	.171473-02
11.50	.443120-01	23.75	.160240-02
11.75	.414093-01	24.00	.149744-02
12.00	.386967-01		

Nitrogen - 13

T 1/2 = 10.0 min

N¹³

A = .06930

ΔT = 1 min

T_{max} = 120 min

T	F	T	F
0.00	.100000+01	48.00	.359222-01
1.00	.933047	49.00	.335171-01
2.00	.870576	50.00	.312730-01
3.00	.812288	51.00	.291792-01
4.00	.757903	52.00	.272255-01
5.00	.707159	53.00	.254027-01
6.00	.659812	54.00	.237019-01
7.00	.615636	55.00	.221150-01
8.00	.574417	56.00	.206343-01
9.00	.535958	57.00	.192528-01
10.00	.500074	58.00	.179637-01
11.00	.466592	59.00	.167610-01
12.00	.435352	60.00	.156388-01
13.00	.406204	61.00	.145917-01
14.00	.379007	62.00	.136148-01
15.00	.353631	63.00	.127032-01
16.00	.329955	64.00	.118527-01
17.00	.307863	65.00	.110591-01
18.00	.287251	66.00	.103187-01
19.00	.268018	67.00	.962781-02
20.00	.250074	68.00	.898319-02
21.00	.233380	69.00	.838174-02
22.00	.217708	70.00	.782055-02
23.00	.203132	71.00	.729694-02
24.00	.189532	72.00	.680839-02
25.00	.176842	73.00	.635254-02
26.00	.165002	74.00	.592722-02
27.00	.153954	75.00	.553037-02
28.00	.143646	76.00	.516010-02
29.00	.134029	77.00	.481461-02
30.00	.125055	78.00	.449226-02
31.00	.116682	79.00	.419149-02
32.00	.108870	80.00	.391085-02
33.00	.101581	81.00	.364901-02
34.00	.947797-01	82.00	.340469-02
35.00	.884339-01	83.00	.317674-02
36.00	.825130-01	84.00	.296405-02
37.00	.769884-01	85.00	.276559-02
38.00	.718338-01	86.00	.258043-02
39.00	.670243-01	87.00	.240766-02
40.00	.625368-01	88.00	.224646-02
41.00	.583498-01	89.00	.209605-02
42.00	.544431-01	90.00	.195571-02
43.00	.507979-01	91.00	.182477-02
44.00	.473968-01	92.00	.170269-02
45.00	.442235-01	93.00	.158860-02
46.00	.412625-01	94.00	.148224-02
47.00	.384999-01	95.00	.138300-02

96.00	.129040-02
97.00	.120401-02
98.00	.112339-02
99.00	.104818-02
100.00	.978001-03
101.00	.912521-03
102.00	.851424-03
103.00	.794419-03
104.00	.741230-03
105.00	.691602-03
106.00	.645297-03
107.00	.602092-03
108.00	.561780-03
109.00	.524167-03
110.00	.489072-03
111.00	.456327-03
112.00	.425775-03
113.00	.397268-03
114.00	.370669-03
115.00	.345852-03
116.00	.322696-03
117.00	.301090-03
118.00	.280931-03
119.00	.262122-03
120.00	.244572-03

Selenium - 81

T 1/2 = 18.6 m

Se⁸¹

A = .03730

ΔT = 1 min

T_{max} = 120 min

T	F	T	F
0.00	.100000+01	48.00	.166893
1.00	.963387	49.00	.160783
2.00	.928115	50.00	.154896
3.00	.894134	51.00	.149225
4.00	.861397	52.00	.143761
5.00	.829859	53.00	.138498
6.00	.799475	54.00	.133427
7.00	.770204	55.00	.128542
8.00	.742004	56.00	.123836
9.00	.714838	57.00	.119302
10.00	.688665	58.00	.114934
11.00	.663451	59.00	.110726
12.00	.639160	60.00	.106671
13.00	.615759	61.00	.102766
14.00	.593214	62.00	.990035-01
15.00	.571495	63.00	.953787-01
16.00	.550571	64.00	.918866-01
17.00	.530413	65.00	.885224-01
18.00	.510993	66.00	.852813-01
19.00	.492284	67.00	.821589-01
20.00	.474260	68.00	.791508-01
21.00	.456896	69.00	.762529-01
22.00	.440167	70.00	.734610-01
23.00	.424052	71.00	.707714-01
24.00	.408526	72.00	.681803-01
25.00	.393569	73.00	.656840-01
26.00	.379159	74.00	.632791-01
27.00	.365277	75.00	.609623-01
28.00	.351903	76.00	.587303-01
29.00	.339019	77.00	.565800-01
30.00	.326606	78.00	.545084-01
31.00	.314648	79.00	.525127-01
32.00	.303128	80.00	.505901-01
33.00	.292030	81.00	.487378-01
34.00	.281338	82.00	.469534-01
35.00	.271037	83.00	.452343-01
36.00	.261114	84.00	.435781-01
37.00	.251553	85.00	.419826-01
38.00	.242343	86.00	.404455-01
39.00	.233470	87.00	.389647-01
40.00	.224922	88.00	.375381-01
41.00	.216687	89.00	.361637-01
42.00	.208754	90.00	.348396-01
43.00	.201111	91.00	.335640-01
44.00	.193747	92.00	.323352-01
45.00	.186654	93.00	.311513-01
46.00	.179820	94.00	.300107-01
47.00	.173237	95.00	.289120-01

96.00	.278534-01
97.00	.268336-01
98.00	.258512-01
99.00	.249047-01
100.00	.239928-01
101.00	.231144-01
102.00	.222681-01
103.00	.214528-01
104.00	.206674-01
105.00	.199107-01
106.00	.191817-01
107.00	.184794-01
108.00	.178028-01
109.00	.171510-01
110.00	.165230-01
111.00	.159181-01
112.00	.153353-01
113.00	.147738-01
114.00	.142329-01
115.00	.137118-01
116.00	.132098-01
117.00	.127261-01
118.00	.122602-01
119.00	.118113-01
120.00	.113788-01

Silicon - 31

T 1/2 = 2.62 hr.

Si³¹

A = .26460

ΔT = .25 hr.

T_{max} = 24 hr.

T	F	T	F
0.00	.100000+01	11.75	.446433-01
0.25	.935990	12.00	.417857-01
0.50	.876078	12.25	.391111-01
0.75	.820001	12.50	.366076-01
1.00	.767513	12.75	.342643-01
1.25	.718385	13.00	.320711-01
1.50	.672401	13.25	.300182-01
1.75	.629361	13.50	.280968-01
2.00	.589076	13.75	.262983-01
2.25	.551370	14.00	.246150-01
2.50	.516077	14.25	.230394-01
2.75	.483043	14.50	.215646-01
3.00	.452123	14.75	.201843-01
3.25	.423183	15.00	.188923-01
3.50	.396095	15.25	.176830-01
3.75	.370742	15.50	.165511-01
4.00	.347011	15.75	.154917-01
4.25	.324799	16.00	.145001-01
4.50	.304008	16.25	.135720-01
4.75	.284549	16.50	.127032-01
5.00	.266335	16.75	.118901-01
5.25	.249287	17.00	.111290-01
5.50	.233330	17.25	.104166-01
5.75	.218395	17.50	.974988-02
6.00	.204416	17.75	.912580-02
6.25	.191331	18.00	.854166-02
6.50	.179084	18.25	.799491-02
6.75	.167621	18.50	.748316-02
7.00	.156892	18.75	.700417-02
7.25	.146849	19.00	.655583-02
7.50	.137449	19.25	.613620-02
7.75	.128651	19.50	.574342-02
8.00	.120416	19.75	.537579-02
8.25	.112709	20.00	.503169-02
8.50	.105494	20.25	.470961-02
8.75	.987415-01	20.50	.440815-02
9.00	.924211-01	20.75	.412599-02
9.25	.865053-01	21.00	.386188-02
9.50	.809681-01	21.25	.361469-02
9.75	.757854-01	21.50	.338331-02
10.00	.709344-01	21.75	.316675-02
10.25	.663939-01	22.00	.296405-02
10.50	.621441-01	22.25	.277432-02
10.75	.581662-01	22.50	.259674-02
11.00	.544430-01	22.75	.243052-02
11.25	.509582-01	23.00	.227494-02
11.50	.476964-01	23.25	.212933-02

23.50
23.75
24.00

.199303-02
.186546-02
.174605-02

Titanium - 51

T 1/2 = 5.8 min

Ti 51

A = .119500

AT = 1.00 min

T_{max} = 120.00 min

T

F

T

F

0.00	.100000+01	48.00	.322765-02
1.00	.887364	49.00	.286410-02
2.00	.787415	50.00	.254150-02
3.00	.698724	51.00	.225524-02
4.00	.620022	52.00	.200122-02
5.00	.550185	53.00	.177581-02
6.00	.488215	54.00	.157579-02
7.00	.433224	55.00	.139830-02
8.00	.384427	56.00	.124080-02
9.00	.341127	57.00	.110104-02
10.00	.302704	58.00	.977023-03
11.00	.268809	59.00	.866975-03
12.00	.238354	60.00	.769323-03
13.00	.211506	61.00	.682669-03
14.00	.187683	62.00	.605776-03
15.00	.166543	63.00	.537544-03
16.00	.147784	64.00	.476997-03
17.00	.131139	65.00	.423270-03
18.00	.116368	66.00	.375595-03
19.00	.103260	67.00	.333289-03
20.00	.916297-01	68.00	.295749-03
21.00	.813089-01	69.00	.262437-03
22.00	.721506-01	70.00	.232877-03
23.00	.640238-01	71.00	.206647-03
24.00	.568124-01	72.00	.183371-03
25.00	.504133-01	73.00	.162717-03
26.00	.447350-01	74.00	.144389-03
27.00	.396962-01	75.00	.128125-03
28.00	.352260-01	76.00	.113694-03
29.00	.312573-01	77.00	.100888-03
30.00	.277367-01	78.00	.895243-04
31.00	.246125-01	79.00	.794407-04
32.00	.218403-01	80.00	.704928-04
33.00	.193803-01	81.00	.625528-04
34.00	.171973-01	82.00	.555071-04
35.00	.152603-01	83.00	.492550-04
36.00	.135414-01	84.00	.437071-04
37.00	.120162-01	85.00	.387841-04
38.00	.106627-01	86.00	.344156-04
39.00	.946173-02	87.00	.305392-04
40.00	.839600-02	88.00	.270994-04
41.00	.745031-02	89.00	.240470-04
42.00	.661113-02	90.00	.213384-04
43.00	.586648-02	91.00	.189350-04
44.00	.520571-02	92.00	.168022-04
45.00	.461936-02	93.00	.149097-04
46.00	.409905-02	94.00	.132303-04
47.00	.363735-02	95.00	.117401-04

96.00	.104177-04
97.00	.924433-05
98.00	.820309-05
99.00	.727912-05
100.00	.645923-05
101.00	.573169-05
102.00	.508610-05
103.00	.451322-05
104.00	.400487-05
105.00	.355377-05
106.00	.315349-05
107.00	.279830-05
108.00	.248311-05
109.00	.220342-05
110.00	.195523-05
111.00	.173500-05
112.00	.153958-05
113.00	.136617-05
114.00	.121229-05
115.00	.107574-05
116.00	.954575-06
117.00	.847055-06
118.00	.751646-06
119.00	.666984-06
120.00	.591857-06

V⁵²

Vanadium - 52

T 1/2 = 3.77 min

A = .183000

AT = 1.00 min

T_{max} = 120.00 min

T

F

T

F

0.00	.100000+01	50.00	.106220-03
1.00	.832768	51.00	.884565-04
2.00	.693503	52.00	.736637-04
3.00	.577527	53.00	.613448-04
4.00	.480946	54.00	.510860-04
5.00	.400517	55.00	.425428-04
6.00	.333537	56.00	.354283-04
7.00	.277799	57.00	.295035-04
8.00	.231369	58.00	.245696-04
9.00	.192627	59.00	.204608-04
10.00	.160414	60.00	.170391-04
11.00	.133587	61.00	.141896-04
12.00	.111247	62.00	.118167-04
13.00	.926432-01	63.00	.984054-05
14.00	.771503-01	64.00	.819489-05
15.00	.642483-01	65.00	.682444-05
16.00	.535039-01	66.00	.568318-05
17.00	.445564-01	67.00	.473277-05
18.00	.371051-01	68.00	.394130-05
19.00	.309000-01	69.00	.328219-05
20.00	.257325-01	70.00	.273330-05
21.00	.214292-01	71.00	.227621-05
22.00	.178456-01	72.00	.189555-05
23.00	.148612-01	73.00	.157856-05
24.00	.123759-01	74.00	.131457-05
25.00	.103063-01	75.00	.109473-05
26.00	.858276-02	76.00	.911659-06
27.00	.714745-02	77.00	.759200-06
28.00	.595217-02	78.00	.632238-06
29.00	.495677-02	79.00	.526508-06
30.00	.412784-02	80.00	.438459-06
31.00	.343754-02	81.00	.365134-06
32.00	.286267-02	82.00	.304072-06
33.00	.238394-02	83.00	.253222-06
34.00	.198527-02	84.00	.210875-06
35.00	.165327-02	85.00	.175610-06
36.00	.137679-02	86.00	.146242-06
37.00	.114655-02	87.00	.121786-06
38.00	.954808-02	88.00	.101419-06
39.00	.795134-03	89.00	.844590-07
40.00	.662162-03	90.00	.703347-07
41.00	.551428-03	91.00	.585725-07
42.00	.459211-03	92.00	.487773-07
43.00	.382417-03	93.00	.406202-07
44.00	.318464-03	94.00	.338272-07
45.00	.265207-03	95.00	.281702-07
46.00	.220856-03	96.00	.234593-07
47.00	.183922-03	97.00	.195361-07
48.00	.153164-03	98.00	.162691-07
49.00	.127550-03	99.00	.135484-07

100.00	.112826-07
101.00	.939583-08
102.00	.782455-08
103.00	.651609-08
104.00	.542634-08
105.00	.451889-08
106.00	.376319-08
107.00	.313386-08
108.00	.260978-08
109.00	.217334-08
110.00	.180989-08
111.00	.150722-08
112.00	.125516-08
113.00	.104526-08
114.00	.870459-09
115.00	.724891-09
116.00	.603666-09
117.00	.502714-09
118.00	.418644-09
119.00	.348633-09
120.00	.290331-09

Zinc-69

T 1/2 = 52 min

Zn⁶⁹

A = .013326

ΔT = 8.00 min

T_{max} = 1440.00 min

T

F

T

F

0.00	.100000-01	384.00	.599287-02
8.00	.898878	392.00	.538686-02
16.00	.807982	400.00	.484213-02
24.00	.728277	408.00	.435249-02
32.00	.652834	416.00	.391235-02
40.00	.586818	424.00	.351673-02
48.00	.527478	432.00	.316111-02
56.00	.474138	440.00	.284145-02
64.00	.426193	448.00	.255412-02
72.00	.383095	456.00	.229584-02
80.00	.344356	464.00	.206368-02
88.00	.309534	472.00	.185500-02
96.00	.278233	480.00	.166742-02
104.00	.250098	488.00	.149880-02
112.00	.224807	496.00	.134724-02
120.00	.202074	504.00	.121101-02
128.00	.181640	512.00	.108855-02
136.00	.163272	520.00	.978470-03
144.00	.146762	528.00	.879525-03
152.00	.131921	536.00	.790586-03
160.00	.118581	544.00	.710640-03
168.00	.106590	552.00	.638779-03
176.00	.958112-01	560.00	.574184-03
184.00	.861225-01	568.00	.516122-03
192.00	.774137-01	576.00	.463930-03
200.00	.695854-01	584.00	.417017-03
208.00	.625488-01	592.00	.374847-03
216.00	.562237-01	600.00	.336942-03
224.00	.505383-01	608.00	.302870-03
232.00	.454278-01	616.00	.272243-03
240.00	.408340-01	624.00	.244713-03
248.00	.367048-01	632.00	.219967-03
256.00	.329931-01	640.00	.197724-03
264.00	.296568-01	648.00	.177729-03
272.00	.266578-01	656.00	.159757-03
280.00	.239621-01	664.00	.143602-03
288.00	.215390-01	672.00	.129081-03
296.00	.193610-01	680.00	.116028-03
304.00	.174031-01	688.00	.104295-03
312.00	.156433-01	696.00	.937484-04
320.00	.140614-01	704.00	.842684-04
328.00	.126395-01	712.00	.757470-04
336.00	.113614-01	720.00	.680873-04
344.00	.102125-01	728.00	.612022-04
352.00	.917978-02	736.00	.550133-04
360.00	.825150-02	744.00	.494502-04
368.00	.741709-02	752.00	.444497-04
376.00	.666706-02	760.00	.399549-04

768.00	.359145-04	1208.00	.102049-06
776.00	.322828-04	1216.00	.917300-07
784.00	.290183-04	1224.00	.824541-07
792.00	.260839-04	1232.00	.741162-07
800.00	.234462-04	1240.00	.666214-07
808.00	.210753-04	1248.00	.598845-07
816.00	.189441-04	1256.00	.538289-07
824.00	.170285-04	1264.00	.483856-07
832.00	.153065-04	1272.00	.434927-07
840.00	.137587-04	1280.00	.390947-07
848.00	.123674-04	1288.00	.351413-07
856.00	.111168-04	1296.00	.315878-07
864.00	.999262-05	1304.00	.283935-07
872.00	.898214-05	1312.00	.255223-07
880.00	.807385-05	1320.00	.229415-07
888.00	.725741-05	1328.00	.206216-07
896.00	.652352-05	1336.00	.185363-07
904.00	.586385-05	1344.00	.166618-07
912.00	.527089-05	1352.00	.149770-07
920.00	.473788-05	1360.00	.134625-07
928.00	.425878-05	1368.00	.121011-07
936.00	.382812-05	1376.00	.108774-07
944.00	.344101-05	1384.00	.977748-08
952.00	.309305-05	1392.00	.878876-08
960.00	.278028-05	1400.00	.790002-08
968.00	.249913-05	1408.00	.710116-08
976.00	.224641-05	1416.00	.638307-08
984.00	.201925-05	1424.00	.573760-08
992.00	.181506-05	1432.00	.515741-08
1000.00	.163152-05	1440.00	.463588-08
1008.00	.146653-05		
1016.00	.131824-05		
1024.00	.118493-05		
1032.00	.106511-05		
1040.00	.957404-06		
1048.00	.860590-06		
1056.00	.773565-06		
1064.00	.695341-06		
1072.00	.625026-06		
1080.00	.561822-06		
1088.00	.505010-06		
1096.00	.453942-06		
1104.00	.408039-06		
1112.00	.366777-06		
1120.00	.329688-06		
1128.00	.296349-06		
1136.00	.266382-06		
1144.00	.239444-06		
1152.00	.215231-06		
1160.00	.193467-06		
1168.00	.173903-06		
1176.00	.156318-06		
1184.00	.140510-06		
1192.00	.126302-06		
1200.00	.113530-06		

Zinc - 71

T 1/2 = 3.8 h

Zn⁷¹

A = .177700

ΔT = .25 h

T_{max} = 60.00 h

T

F

T

F

0.00	.100000+01	11.75	.123938
0.25	.956547	12.00	.118552
0.50	.914983	12.25	.113401
0.75	.875224	12.50	.108473
1.00	.837193	12.75	.103760
1.25	.800815	13.00	.992513-01
1.50	.766018	13.25	.949386-01
1.75	.732732	13.50	.908133-01
2.00	.700893	13.75	.868672-01
2.25	.670437	14.00	.830926-01
2.50	.641305	14.25	.794820-01
2.75	.613439	14.50	.760283-01
3.00	.586783	14.75	.727246-01
3.25	.561286	15.00	.695646-01
3.50	.536896	15.25	.665418-01
3.75	.513567	15.50	.636504-01
4.00	.491251	15.75	.608846-01
4.25	.469905	16.00	.582390-01
4.50	.449486	16.25	.557084-01
4.75	.429955	16.50	.532877-01
5.00	.411272	16.75	.509722-01
5.25	.393401	17.00	.487573-01
5.50	.376307	17.25	.466387-01
5.75	.359955	17.50	.446121-01
6.00	.344314	17.75	.426736-01
6.25	.329353	18.00	.408193-01
6.50	.315042	18.25	.390456-01
6.75	.301352	18.50	.373490-01
7.00	.288258	18.75	.357261-01
7.25	.275732	19.00	.341737-01
7.50	.263751	19.25	.326887-01
7.75	.252290	19.50	.312683-01
8.00	.241328	19.75	.299096-01
8.25	.230841	20.00	.286100-01
8.50	.220811	20.25	.273668-01
8.75	.211216	20.50	.261776-01
9.00	.202038	20.75	.250401-01
9.25	.193259	21.00	.239521-01
9.50	.184861	21.25	.229113-01
9.75	.176828	21.50	.219157-01
10.00	.169145	21.75	.209634-01
10.25	.161795	22.00	.200525-01
10.50	.154765	22.25	.191812-01
10.75	.148040	22.50	.183477-01
11.00	.141607	22.75	.175505-01
11.25	.135454	23.00	.167878-01
11.50	.129568	23.25	.160584-01

23.50	.153606-01	37.75	.122089-02
23.75	.146931-01	38.00	.116784-02
24.00	.140547-01	38.25	.111709-02
24.25	.134440-01	38.50	.106855-02
24.50	.128598-01	38.75	.102212-02
24.75	.123010-01	39.00	.977707-03
25.00	.117665-01	39.25	.935223-03
25.25	.112552-01	39.50	.894586-03
25.50	.107661-01	39.75	.855713-03
25.75	.102983-01	40.00	.818530-03
26.00	.985083-02	40.25	.782963-03
26.25	.942278-02	40.50	.748941-03
26.50	.901334-02	40.75	.716398-03
26.75	.862168-02	41.00	.685268-03
27.00	.824705-02	41.25	.655492-03
27.25	.788869-02	41.50	.627009-03
27.50	.754591-02	41.75	.599764-03
27.75	.721802-02	42.00	.573702-03
28.00	.690437-02	42.25	.548773-03
28.25	.660436-02	42.50	.524928-03
28.50	.631738-02	42.75	.502118-03
28.75	.604288-02	43.00	.480300-03
29.00	.578030-02	43.25	.459429-03
29.25	.552913-02	43.50	.439466-03
29.50	.528888-02	43.75	.420370-03
29.75	.505906-02	44.00	.402104-03
30.00	.483923-02	44.25	.384631-03
30.25	.462895-02	44.50	.367918-03
30.50	.442781-02	44.75	.351931-03
30.75	.423541-02	45.00	.336639-03
31.00	.405137-02	45.25	.322011-03
31.25	.387533-02	45.50	.308019-03
31.50	.370693-02	45.75	.294634-03
31.75	.354586-02	46.00	.281832-03
32.00	.339178-02	46.25	.269585-03
32.25	.324440-02	46.50	.257871-03
32.50	.310342-02	46.75	.246666-03
32.75	.296857-02	47.00	.235948-03
33.00	.283958-02	47.25	.225695-03
33.25	.271619-02	47.50	.215888-03
33.50	.259816-02	47.75	.206507-03
33.75	.248527-02	48.00	.197534-03
34.00	.237728-02	48.25	.188951-03
34.25	.227398-02	48.50	.180740-03
34.50	.217517-02	48.75	.172886-03
34.75	.208065-02	49.00	.165374-03
35.00	.199024-02	49.25	.158188-03
35.25	.190376-02	49.50	.151314-03
35.50	.182103-02	49.75	.144739-03
35.75	.174191-02	50.00	.138450-03
36.00	.166622-02	50.25	.132434-03
36.25	.159381-02	50.50	.126679-03
36.50	.152456-02	50.75	.121175-03
36.75	.145831-02	51.00	.115910-03
37.00	.139494-02	51.25	.110873-03
37.25	.133433-02	51.50	.106055-03
37.50	.127635-02	51.75	.101447-03

52.00	.970388-04
52.25	.928222-04
52.50	.887888-04
52.75	.849307-04
53.00	.812402-04
53.25	.777101-04
53.50	.743334-04
53.75	.711034-04
54.00	.680138-04
54.25	.650584-04
54.50	.622314-04
54.75	.595273-04
55.00	.569407-04
55.25	.544685-04
55.50	.520998-04
55.75	.498359-04
56.00	.476704-04
56.25	.455990-04
56.50	.436176-04
56.75	.417223-04
57.00	.399093-04
57.25	.381752-04
57.50	.365164-04
57.75	.349296-04
58.00	.334118-04
58.25	.319600-04
58.50	.305713-04
58.75	.292429-04
59.00	.279722-04
59.25	.267567-04
59.50	.255941-04
59.75	.244819-04
60.00	.234181-04

APPENDIX I

FORTRAN PROGRAM

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EXPONENTIAL FUNCTION
DIMENSION TITLE(20)
90 READ 10, (TITLE(I),I=1,20)
10 FORMAT(20A4)
   PUNCH 20, (TITLE(I),I=1,20)
20 FORMAT(//20A4//)
   READ 30, A,DT,TMAX
30 FORMAT(3F10.6)
   PUNCH 40, A,DT,TMAX
40 FORMAT(5X,3HA = F10.6,5X,4HDT =F10.5,5X,6HTMAX =F10.4//5X,1HT16X,1H
1F//)
   T=0.
100 F=EXP(-A*T)
   PUNCH 50, T,F
   50 FORMAT(F10.4,6X,E14.8)
   IF(T-TMAX)200,300,999
200 T=T+DT
   GO TO 100
300 PUNCH 310
310 FORMAT(79X,1H9)
   GO TO 90
999 STOP
   END
```

APPENDIX II

ISOTOPES OF SIMILAR HALF LIVES

Isotope	t 1/2	Similar Isotope	t 1/2
Americium-246	25m	Iodine-128	25m
Antimony-124M	21.0m	Gallium-70	21.0m
Arsenic-70	52m	Zinc-69	52m
Arsenic-74	18d	Bromine-80	18m
Barium-141	18m	Bromine-80	18m
Bismuth-199	25m	Iodine-128	25m
Bromine-78M	6.5m	Aluminum-29	6.56m
Cadmium-115	2.3d	Aluminum-28	2.3m
Cadmium-119	10m	Nitrogen-13	10m
Californium-244	25m	Iodine-128	25m
Californium-247	2.5h	Nickel-65	2.56h
Cerium-141	32.5d	Chlorine-34	33m
Cerium-143	33h	Chlorine-34	33m
Cesium-128	3.8m	Vanadium-52	3.77m
Cesium-132	6.5d	Aluminum-29	6.56m
Cesium-139	9.5m	Magnesium-27	9.5m
Copper-62	9.9m	Nitrogen-13	10m
Curium-238	2.5h	Nickel-65	2.56h
Einsteinium-248	25m	Iodine-128	25m
Einsteinium-251	1.5d	Bromine-82	1.5d
Einsteinium-254	1.5d	Bromine-82	1.5d
Europium-144	18m	Bromine-80	18m
Gadolinium-159	18h	Bromine-80	18m
Gadolinium-161	3.7m	Vanadium-52	3.77m
Germanium-66	2.5h	Nickel-65	2.56h
Holmium-161	2.5h	Nickel-65	2.56h

Isotope	t 1/2	Similar Isotope	t 1/2
Holmium-164	36.7m	Chlorine-38	37.3m
Holmium-159	33m	Chlorine-34	33m
Indium-111	2.8d	Antimony-122	2.8d
Indium-112M	20.7m	Carbon-11	20.5m
Iodine-132	2.3h	Aluminum-28	2.3m
Iodine-133	20.8h	Gallium-70	21.0m
Iodine-134	52.5m	Zinc-69	52m
Iodine-135	6.7h	Cadmium-107	6.7h
Lanthanum-134	6.5m	Aluminum-29	6.56m
Lanthanum-136	9.5m	Magnesium-27	9.5m
Lanthanum-141	3.8h	Zinc-71	3.8h
Lead-196	37m	Chlorine-38	37.3m
Lead-212	10.6h	Cobalt-60M	10.5m
Lutecium-176	3.71h	Zinc-71	3.8h
Magnesium-28	21.3h	Gallium-70	21.0m
Manganese-52M	21.3m	Gallium-70	21.0m
Molybdenum-99	2.75d	Antimony-122	2.8d
Neodymium-149	1.9h	Fluorine-18	1.86h
Neptunium-239	2.35d	Aluminum-28	2.3m
Nickel-57	1.5d	Bromine-82	1.5d
Niobium-92	10.0d	Nitrogen-13	10m
Niobium-94M	6.6m	Aluminum-29	6.56m
Osmium-190M	9.5m	Magnesium-27	9.5m
Osmium-195	6.5m	Aluminum-29	6.56m
Palladium-114	2.4m	Aluminum-28	2.3m
Platinum-186	2.5h	Nickel-65	2.56h

Isotope	t 1/2	Similar Isotope	t 1/2
Platinum-197	20h	Carbon-11	20.5m
Praseodymium-145	5.9h	Titanium-51	5.8m
Polonium-201	18m	Bromine-80	18m
Polonium-204	3.8h	Zinc-71	3.8h
Plutonium-233	20m	Carbon-11	20.5m
Promethium-141	20m	Carbon-11	20.5m
Protactinium-229	1.5d	Bromine-82	1.5d
Protactinium-234	6.66h	Cadmium-107	6.7h
Radon-221	25m	Iodine-128	25m
Rhenium-188M	18.7m	Selenium-81	18.6m
Rhenium-180	2.4m	Aluminum-28	2.3m
Rhodium-105	1.5d	Bromine-82	1.5d
Rubidium-84M	21m	Gallium-70	21.0m
Rubidium-86	18.7d	Selenium-81	18.6m
Rubidium-88	18m	Bromine-80	18m
Ruthenium-97	2.9d	Antimony-122	2.8d
Samarium-155	25m	Iodine-128	25m
Scandium-46	85d	Barium-139	85m
Selenium-83	25m	Iodine-128	25m
Silver-108	2.4m	Aluminum-28	2.3m
Silver-115	21.1m	Gallium-70	21m
Strontium-91	9.7h	Magnesium-27	9.5m
Sulphur-37	5.1m	Copper-66	5.1m
Tantalum-183	5.2d	Copper-66	5.1m
Tantalum-186	10.5m	Cobalt-60M	10.5m
Technetium-105	10m	Nitrogen-13	10m
Thulium-168	85d	Barium-139	85m

Isotope	t 1/2	Similar Isotope	t 1/2
Tin-109	18.1m	Bromine-80	18m
Tin-125M	9.7m	Magnesium-27	9.5m
Xenon-125	18h	Bromine-80	18m
Yttrium-93	10.1h	Nitrogen-13	10m
Yttrium-95	10.5m	Cobalt-60M	10.5m
Yttrium-84	3.7h	Zinc-71	3.8h