Unclassified
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

ARO 15208.8-P

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER (18) AR (19) 15208.8-P
2. GOVT ACCESSION NO. AD-A090 894
3. RECIPIENT'S CATALOG NUMBER

4. TITLE (and Subtitle) (6) RELATIVISTIC RADIATIONLESS TRANSITION PROBABILITIES FOR ATOMIC K AND L SHELLS
5. TYPE OF REPORT & PERIOD COVERED: REPRINT
6. PERFORMING ORG. REPORT NUMBER

7. AUTHOR(s) (10) MAU HSIUNG CHEN, BERND CRASEMANN, AND HANS MARK
8. CONTRACT OR GRANT NUMBER(s) (15) DAAG29-78-G-0010, AFOSR-79-0026

9. PERFORMING ORGANIZATION NAME AND ADDRESS
Department of Physics
University of Oregon (17)
Eugene, OR 97403
10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: P-15208-P

11. CONTROLLING OFFICE NAME AND ADDRESS
U.S. Army Research Office (11) 1979
P.O. Box 12211
Research Triangle Park, N.C. 27709
12. REPORT DATE: JULY 1979
13. NUMBER OF PAGES: 25

14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)
15. SECURITY CLASS. (of this report): Unclassified
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

SUBMITTED FOR ANNOUNCEMENT ONLY

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

REPRINTED FROM ATOMIC DATA AND NUCLEAR DATA TABLES 24, 13-37 (1979).

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

ATOMIC PHYSICS
RADIATIONLESS TRANSITIONS
AUGER PROCESSES
X RAYS

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

ARO 15208.8-P

ATOMIC DATA AND NUCLEAR DATA TABLES **24**, 13–37 (1979)

RELATIVISTIC RADIATIONLESS TRANSITION PROBABILITIES FOR ATOMIC *K*- AND *L*-SHELLS*

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Auger and Coster–Kronig transition probabilities have been calculated *ab initio* relativistically from perturbation theory, for frozen orbitals, in the Dirac–Hartree–Slater approach. Results in the j–j coupling scheme are tabulated for ≥22 elements with atomic numbers $18 \leq Z \leq 96$.

* Work supported in part by the Air Force Office of Scientific Research under Grant 79-0026 and by the U.S. Army Research Office under Grant DAAG29-78-G-0010

0092-640X/79/070013-25$02.00/0

CONTENTS

INTRODUCTION

Vacancies in atomic inner shells are, in general, filled predominantly by radiationless transitions. Vacancy lifetimes are therefore determined mainly by Auger and Coster–Kronig transition rates. The basic ansatz for the calculation of Auger rates was formulated by Wentzel in 1927;[1] since that time, much theoretical work has been done on the subject, both for the derivation of theoretical x-ray fluorescence yields[2] and for the prediction and interpretation of Auger spectra and lifetimes of excited states.[3,4]

The bulk of theoretical work on Auger transitions has heretofore been confined to nonrelativistic calculations. The few relativistic calculations that have been performed were restricted to a limited number of elements and types of transitions.[5–9] The advent of modern fast computers has now made it possible to conduct more extensive and systematic studies. In this paper, we report on the results of relativistic calculations of the rates of all energetically possible radiationless transitions with intensities above 10^{-5} milliatomic units, to initial K- and $L_{1,2,3}$-shell vacancies in $\geq$22 elements with atomic numbers $18 \leq Z \leq 96$.

Theory

Transition Rates

We calculate the Auger transition probabilities from perturbation theory, in j–j coupling, assuming frozen orbitals. The total rate for a transition $n_1'\kappa_1' \rightarrow n_1\kappa_1 n_2\kappa_2$ is

$$T = \tau(2j_1' + 1)^{-1} \sum_{\substack{J,J' \\ M,M'}} \sum_{\kappa_2'} |D - E|^2, \qquad (1)$$

where

$$\begin{aligned} \tau &= \tfrac{1}{2} \quad \text{if} \quad n_1\kappa_1 = n_2\kappa_2, \\ &= 1 \quad \text{otherwise.} \end{aligned} \qquad (2)$$

Here n is the principal quantum number and we have $\kappa = (l - j)(2j + 1)$. The direct and exchange matrix elements are

$$D = \langle j_1'(1) j_2'(2) J'M' | V_{12} | j_1(1) j_2(2) JM \rangle, \qquad (3)$$

$$E = \langle j_1'(1) j_2'(2) J'M' | V_{12} | j_1(2) j_2(1) JM \rangle. \qquad (4)$$

The primed quantum numbers j_1' and j_2' pertain to the major components of the wave functions of the initial hole and of the hole in the continuum (filled by the Auger electron), respectively. The unprimed j_1 and j_2 characterize the final two-hole state. The continuum wave function is normalized to represent one ejected electron per unit time.

Coupling with open outer shells (if any) is not taken into account in Eq. (1). No error is introduced by this approximation because such coupling does not

produce appreciable shifts or splitting in the K Auger-electron energy. One can therefore sum over final states and the resultant rate is independent of the passive-electron structure.[3]

The wave functions are solutions of the Dirac–Hartree–Slater equations.[10] The two-electron operator V_{12} is chosen according to the original Møller formula,[11]

$$V_{12} = (1 - \boldsymbol{\alpha}_1 \cdot \boldsymbol{\alpha}_2) \exp(i\omega r_{12})/r_{12}, \qquad (5)$$

where the $\boldsymbol{\alpha}_i$ are Dirac matrices, and ω is the wave number of the virtual photon. The form V_{12} of the interaction operator is suitable for electron orbitals in a local potential, as in the Dirac–Hartree–Slater model used here.

The direct and exchange matrix elements are evaluated through standard techniques.[11,12] Details are provided in Ref. 11.

Energies

Auger transition energies were derived in a way different from that used for Coster–Kronig energies. The latter are small, and Coster–Kronig rates are exceedingly energy sensitive. We therefore use Coster–Kronig energies from relativistic, relaxed-orbital Dirac–Hartree–Slater calculations that include QED corrections.[13] Auger transition energies, on the other hand, are larger and the transition probabilities are less sensitive to energy values. There are very many possible Auger transitions that can deexcite any given inner-shell vacancy state of a heavy element (about 200 final two-hole configurations in j–j coupling); hence we use the j–j configuration *average* energies in the calculations. These average energies were found by using the "$Z + 1$ rule" with theoretical neutral-atom binding energies.[10] Comparison with relativistic Dirac–Hartree–Slater calculations[13] shows that the "$Z + 1$ rule" introduces an error of approximately 30 eV out of a few keV. The effect on the Auger matrix elements caused by this error is found to be negligible.

Numerical Calculations

The wave functions were generated according to the Dirac–Hartree–Slater approach[12] for configurations that contain one initial inner-shell vacancy. The continuum wave functions were obtained by solving the Dirac–Slater equations with the same atomic potential as that used for the initial state. With this treatment, the orthogonality of the wave functions is assured, and the approximation is good for all but the lightest elements. The continuum wave function is normalized to represent one electron ejected per unit time.

A general relativistic Auger program[11] was used to compute the radiationless transition probabilities. Results are listed in milliatomic units: 1 ma.u. $= 0.02721$ eV/$\hbar = 4.134 \times 10^{13}$ s^{-1}.

Coupling and Comparison with Measurements

For the calculation of individual Auger-line intensities, it is important to apply the appropriate angular-momentum coupling scheme. For very light elements ($Z \leq 20$), the electrostatic interaction dominates and Russell–Saunders (LS) coupling applies. For elements with atomic numbers $20 \leq Z \leq 60$, the spin–orbit interaction is not negligible compared with the electrostatic interaction, and intermediate coupling is more appropriate than LS coupling to describe the spectrum.[14–17] For heavy elements ($Z \geq 60$), the spin–orbit interaction dominates over the electrostatic interaction, and the j–j coupling scheme applies.

The radiationless transition rates in the present tables are *calculated in j–j coupling*; hence individual line intensities are expected to agree closely with measurements only for $Z \geq 60$. On the other hand, the coupling scheme is immaterial if one considers the intensities of *groups* of transitions that include all possible j–j configurations which correspond to a given LS configuration. Such a group might, for example, consist of the j–j configurations which correspond to the $3p3d$ ($M_{2,3}M_{4,5}$) final-state two-hole LS configuration, namely, $3p_{1/2}3d_{3/2}$, $3p_{1/2}3d_{5/2}$, $3p_{3/2}3d_{3/2}$, $3p_{3/2}3d_{5/2}$ (M_2M_4, M_2M_5, M_3M_4, M_3M_5). Similarly, the group associated with the $3s3p$ ($M_1M_{2,3}$) LS configuration is $3s3p_{1/2}$ and $3s3p_{3/2}$ (M_1M_2 and M_1M_3). *For such groups, the (sums of) intensities listed in the present tables apply for all atomic numbers.*

The present computations are performed entirely within the framework of an independent-particle model; thus, the effect of electron–electron Coulomb correlation is not included. Especially for the very light elements correlation effects are important in predicting relative intensities.[14–17]

In accordance with the foregoing considerations, measured intensities in the K–LX spectra of heavy elements agree well with the present calculations, and K-level widths and fluorescence yields derived from these calculations agree extremely well with measurements.[18] Results from the present calculations for the L-shells have been compared with measured L-Auger spectra of Pt and U. Reasonable agreement between theory and experiment is found, both in energies (to within 25 eV) and in relative intensities (to within 25% for strong lines).[19] A calculation of the K–LL-Auger spectrum, beginning with the relativistic Auger matrix elements in j–j coupling from the present work and including both configuration interaction and intermediate coupling, leads to very good agreement with experiment over the entire range of atomic numbers from $Z = 18$ to $Z = 96$.[20]

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EXPLANATION OF TABLES

All transition rates are listed in milliatomic units (ma.u.); 1 ma.u. = 0.02721 eV/$\hbar$ = 4.134×10^{13} s^{-1}.

Z	Atomic number
Element	Chemical symbol for the element
L_1L_1, etc.	Final two-hole state. For example, in the K-shell table the entries under L_2M_1 are the $K-L_2M_1$ Auger transition rates*

* In the nl_j notation, where n is the principal quantum number, l the orbital angular momentum and j the total angular momentum (in multiples of $\hbar$), the states that occur in the present tables are

K	$1s_{1/2}$	M_4	$3d_{3/2}$	N_6	$4f_{5/2}$
L_1	$2s_{1/2}$	M_5	$3d_{5/2}$	N_7	$4f_{7/2}$
L_2	$2p_{1/2}$	N_1	$4s_{1/2}$	O_1	$5s_{1/2}$
L_3	$2p_{3/2}$	N_2	$4p_{1/2}$	O_2	$5p_{1/2}$
M_1	$3s_{1/2}$	N_3	$4p_{3/2}$	O_3	$5p_{3/2}$
M_2	$3p_{1/2}$	N_4	$4d_{3/2}$	O_4	$5d_{3/2}$
M_3	$3p_{3/2}$	N_5	$4d_{5/2}$	O_5	$5d_{5/2}$

TABLE I. *K*-Shell Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	L_1L_1	L_1L_2	L_1L_3	L_1M_1	L_1M_2	L_1M_3	L_1M_4	L_1M_5	L_1N_1
18	Ar	1.456	1.604	3.072	0.324	0.151	0.288			
20	Ca	1.570	1.737	3.291	0.396	0.202	0.381			0.045
25	Mn	1.833	2.042	3.746	0.488	0.259	0.473	0.012	0.003	0.045
30	Zn	2.084	2.329	4.094	0.564	0.306	0.534	0.017	0.023	0.043
35	Br	2.345	2.630	4.378	0.686	0.388	0.641	0.029	0.037	0.084
36	Kr	2.402	2.697	4.434	0.713	0.406	0.663	0.031	0.039	0.092
40	Zr	2.638	2.986	4.642	0.828	0.485	0.751	0.040	0.050	0.136
42	Mo	2.767	3.150	4.747	0.890	0.528	0.794	0.045	0.054	0.155
45	Rh	2.976	3.422	4.902	0.988	0.598	0.856	0.052	0.061	0.183
47	Ag	3.126	3.628	5.008	1.059	0.649	0.898	0.057	0.065	0.203
50	Sn	3.372	3.974	5.169	1.172	0.735	0.961	0.064	0.071	0.239
52	Te	3.551	4.233	5.278	1.253	0.797	1.003	0.069	0.075	0.265
54	Xe	3.740	4.524	5.393	1.340	0.867	1.046	0.074	0.078	0.293
56	Ba	3.945	4.841	5.507	1.433	0.943	1.089	0.080	0.082	0.323
60	Nd	4.406	5.586	5.754	1.640	1.119	1.180	0.091	0.089	0.379
63	Eu	4.798	6.262	5.955	1.815	1.276	1.251	0.100	0.093	0.424
67	Ho	5.396	7.336	6.238	2.080	1.523	1.348	0.113	0.099	0.491
70	Yb	5.909	8.312	6.470	2.306	1.746	1.426	0.123	0.104	0.549
74	W	6.694	9.870	6.798	2.649	2.098	1.534	0.137	0.108	0.642
80	Hg	8.139	12.934	7.344	3.278	2.733	1.710	0.159	0.115	0.820
83	Bi	9.015	14.881	7.643	3.657	3.217	1.805	0.171	0.117	0.929
88	Ra	10.758	18.956	8.185	4.411	4.120	1.978	0.192	0.121	1.149
90	Th	11.574	20.942	8.417	4.764	4.557	2.052	0.200	0.122	1.253
92	U	12.471	23.168	8.658	5.153	5.046	2.129	0.209	0.123	1.367
96	Cm	14.555	28.516	9.170	6.053	6.216	2.292	0.227	0.125	1.631

Z	Element	L_1N_2	L_1N_3	L_1O_1	L_1O_2	L_1O_3	L_2L_2	L_2L_3	L_2M_1	L_2M_2
18	Ar						0.294	7.277	0.156	0.053
20	Ca						0.320	7.825	0.190	0.070
25	Mn						0.373	8.934	0.234	0.089
30	Zn						0.415	9.723	0.269	0.102
35	Br	0.036	0.044				0.448	10.282	0.325	0.122
36	Kr	0.040	0.065				0.455	10.384	0.338	0.126
40	Zr	0.069	0.106				0.479	10.726	0.394	0.142
42	Mo	0.080	0.120				0.490	10.881	0.425	0.150
45	Rh	0.099	0.140	0.009			0.507	11.085	0.475	0.160
47	Ag	0.112	0.154	0.009			0.519	11.233	0.513	0.167
50	Sn	0.138	0.179	0.029	0.012		0.535	11.413	0.575	0.178
52	Te	0.158	0.197	0.037	0.017	0.010	0.546	11.524	0.621	0.184
54	Xe	0.179	0.215	0.045	0.022	0.025	0.558	11.635	0.673	0.191
56	Ba	0.203	0.234	0.053	0.031	0.035	0.570	11.748	0.729	0.197
60	Nd	0.248	0.260	0.066	0.037	0.037	0.593	11.950	0.861	0.210
63	Eu	0.287	0.280	0.072	0.040	0.038	0.612	12.104	0.980	0.220
67	Ho	0.347	0.305	0.081	0.047	0.040	0.639	12.309	1.168	0.233
70	Yb	0.402	0.325	0.089	0.053	0.041	0.659	12.456	1.340	0.243
74	W	0.494	0.358	0.116	0.076	0.052	0.688	12.643	1.614	0.256
80	Hg	0.680	0.417	0.171	0.127	0.075	0.735	12.938	2.154	0.277
83	Bi	0.801	0.449	0.207	0.162	0.089	0.761	13.081	2.499	0.288
88	Ra	1.054	0.510	0.279	0.238	0.112	0.807	13.327	3.222	0.308
90	Th	1.178	0.536	0.315	0.278	0.124	0.827	13.424	3.574	0.317
92	U	1.317	0.563	0.352	0.320	0.135	0.847	13.543	3.970	0.326
96	Cm	1.650	0.620	0.439	0.420	0.157	0.891	13.754	4.920	0.346

TABLE I. *K*-Shell Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	L_2M_3	L_2M_4	L_2M_5	L_2N_1	L_2N_2	L_2N_3	L_2N_5	L_2O_1	L_2O_3
18	Ar	0.607								
20	Ca	0.797			0.021					
25	Mn	0.977	0.017	0.011	0.021					
30	Zn	1.087	0.024	0.086	0.020					
35	Br	1.280	0.038	0.138	0.039	0.011	0.087			
36	Kr	1.318	0.041	0.147	0.043	0.013	0.128			
40	Zr	1.463	0.052	0.184	0.063	0.020	0.202			
42	Mo	1.530	0.058	0.201	0.071	0.022	0.225			
45	Rh	1.623	0.065	0.225	0.085	0.026	0.260	0.016	0.004	
47	Ag	1.683	0.070	0.240	0.095	0.029	0.279	0.027	0.004	
50	Sn	1.768	0.078	0.261	0.113	0.033	0.319	0.038	0.014	
52	Te	1.822	0.083	0.274	0.126	0.036	0.345	0.045	0.017	0.018
54	Xe	1.874	0.088	0.287	0.142	0.039	0.372	0.053	0.021	0.043
56	Ba	1.926	0.092	0.298	0.158	0.042	0.398	0.060	0.028	0.059
60	Nd	2.027	0.103	0.321	0.191	0.046	0.431	0.068	0.034	0.061
63	Eu	2.100	0.111	0.337	0.220	0.048	0.451	0.072	0.037	0.062
67	Ho	2.196	0.121	0.356	0.265	0.052	0.477	0.078	0.044	0.062
70	Yb	2.265	0.129	0.370	0.307	0.054	0.495	0.083	0.050	0.060
74	W	2.356	0.141	0.385	0.377	0.059	0.528	0.090	0.068	0.076
80	Hg	2.496	0.158	0.404	0.520	0.066	0.583	0.102	0.108	0.104
83	Bi	2.568	0.168	0.412	0.614	0.070	0.612	0.107	0.137	0.119
88	Ra	2.693	0.186	0.423	0.813	0.077	0.665	0.116	0.193	0.148
90	Th	2.745	0.194	0.427	0.911	0.080	0.686	0.120	0.223	0.161
92	U	2.800	0.202	0.431	1.021	0.083	0.709	0.123	0.261	0.169
96	Cm	2.909	0.220	0.437	1.287	0.090	0.754	0.129	0.344	0.190

Z	Element	L_3L_3	L_3M_1	L_3M_2	L_3M_3	L_3M_4	L_3M_5	L_3N_1	L_3N_2	L_3N_3
18	Ar	4.132	0.299	0.607	0.697					
20	Ca	4.429	0.361	0.796	0.913		0.040			
25	Mn	5.000	0.428	0.978	1.110	0.077	0.013	0.039		
30	Zn	5.373	0.472	1.090	1.222	0.104	0.105	0.035		
35	Br	5.592	0.541	1.280	1.419	0.163	0.165	0.065	0.116	0.096
36	Kr	5.730	0.611	1.457	1.597	0.214	0.217	0.098	0.202	0.222
40	Zr	5.730	0.611	1.457	1.597	0.214	0.217	0.098	0.202	0.222
42	Mo	5.769	0.638	1.521	1.659	0.231	0.235	0.107	0.224	0.244
45	Rh	5.806	0.678	1.610	1.741	0.255	0.259	0.121	0.260	0.280
47	Ag	5.837	0.705	1.666	1.793	0.269	0.274	0.130	0.279	0.299
50	Sn	5.855	0.744	1.745	1.861	0.289	0.294	0.146	0.317	0.337
52	Te	5.861	0.770	1.795	1.903	0.300	0.306	0.156	0.342	0.363
54	Xe	5.864	0.797	1.842	1.943	0.311	0.318	0.167	0.367	0.388
56	Ba	5.871	0.823	1.889	1.981	0.320	0.327	0.178	0.391	0.412
60	Nd	5.865	0.879	1.979	2.051	0.338	0.345	0.194	0.422	0.439
63	Eu	5.860	0.923	2.043	2.099	0.350	0.358	0.205	0.441	0.454
67	Ho	5.856	0.982	2.125	2.160	0.362	0.369	0.221	0.465	0.473
70	Yb	5.848	1.030	2.183	2.202	0.370	0.377	0.233	0.482	0.485
74	W	5.834	1.097	2.257	2.254	0.378	0.384	0.252	0.509	0.509
80	Hg	5.827	1.205	2.365	2.334	0.386	0.388	0.285	0.554	0.550
83	Bi	5.822	1.264	2.419	2.374	0.389	0.389	0.304	0.576	0.572
88	Ra	5.822	1.369	2.508	2.446	0.392	0.388	0.337	0.614	0.610
90	Th	5.822	1.414	2.543	2.475	0.393	0.386	0.351	0.629	0.626
92	U	5.834	1.459	2.578	2.504	0.395	0.385	0.366	0.643	0.641
96	Cm	5.840	1.556	2.649	2.564	0.397	0.380	0.396	0.672	0.672

TABLE I. *K*-Shell Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	L_3N_4	L_3N_5	L_3O_1	L_3O_2	L_3O_3	M_1M_1	M_1M_2	M_1M_3	M_1N_1
18	Ar						0.018	0.015	0.028	
20	Ca						0.025	0.022	0.042	0.006
25	Mn						0.032	0.030	0.054	0.006
30	Zn						0.038	0.035	0.062	0.006
35	Br						0.050	0.048	0.079	0.012
36	Kr	0.009		0.012			0.064	0.064	0.099	0.021
40	Zr	0.009					0.064	0.064	0.099	0.021
42	Mo	0.020	0.003	0.006			0.071	0.071	0.107	0.025
45	Rh	0.027	0.018	0.006			0.081	0.083	0.118	0.030
47	Ag	0.031	0.031	0.006			0.089	0.092	0.126	0.034
50	Sn	0.042	0.042	0.017	0.027		0.101	0.107	0.138	0.041
52	Te	0.051	0.051	0.022	0.036	0.019	0.109	0.118	0.146	0.046
54	Xe	0.058	0.059	0.026	0.044	0.045	0.119	0.131	0.154	0.052
56	Ba	0.064	0.066	0.032	0.059	0.062	0.128	0.144	0.162	0.058
60	Nd	0.071	0.072	0.034	0.061	0.062	0.151	0.176	0.178	0.069
63	Eu	0.076	0.077	0.035	0.063	0.063	0.169	0.205	0.191	0.079
67	Ho	0.080	0.082	0.036	0.064	0.062	0.198	0.250	0.209	0.094
70	Yb	0.083	0.084	0.038	0.062	0.060	0.222	0.292	0.223	0.105
74	W	0.089	0.090	0.046	0.079	0.076	0.258	0.358	0.242	0.125
80	Hg	0.097	0.098	0.059	0.101	0.097	0.325	0.488	0.274	0.162
83	Bi	0.101	0.101	0.067	0.117	0.113	0.366	0.571	0.291	0.185
88	Ra	0.108	0.107	0.081	0.134	0.132	0.446	0.745	0.321	0.232
90	Th	0.110	0.109	0.088	0.145	0.144	0.483	0.830	0.334	0.253
92	U	0.113	0.110	0.093	0.155	0.153	0.525	0.925	0.347	0.277
96	Cm	0.118	0.113	0.104	0.168	0.167	0.620	1.153	0.376	0.333

Z	Element	M_1N_2	M_1N_3	M_2M_3	M_2N_1	M_2N_3	M_3M_3	M_3M_4	M_3M_5	M_3N_1
18	Ar			0.052			0.030			
20	Ca			0.083	0.003		0.048			0.005
25	Mn			0.109	0.003		0.063	0.007	0.001	0.005
30	Zn			0.124	0.003		0.070	0.010	0.010	0.005
35	Br	0.004	0.006	0.162	0.006	0.011	0.091	0.017	0.017	0.010
36	Kr	0.009	0.014	0.202	0.010	0.028	0.113	0.024	0.024	0.016
40	Zr	0.009	0.014	0.202	0.010	0.028	0.113	0.024	0.024	0.016
42	Mo	0.011	0.016	0.218	0.012	0.032	0.121	0.027	0.027	0.018
45	Rh	0.014	0.019	0.240	0.015	0.038	0.132	0.031	0.031	0.021
47	Ag	0.016	0.022	0.254	0.017	0.042	0.139	0.033	0.033	0.024
50	Sn	0.020	0.026	0.275	0.021	0.050	0.150	0.037	0.037	0.027
52	Te	0.023	0.029	0.288	0.024	0.055	0.156	0.039	0.039	0.030
54	Xe	0.027	0.032	0.301	0.028	0.060	0.163	0.041	0.041	0.033
56	Ba	0.031	0.035	0.314	0.031	0.065	0.169	0.043	0.043	0.036
60	Nd	0.039	0.039	0.340	0.039	0.072	0.182	0.047	0.047	0.040
63	Eu	0.046	0.043	0.359	0.046	0.077	0.190	0.050	0.050	0.044
67	Ho	0.057	0.047	0.383	0.056	0.083	0.202	0.053	0.053	0.049
70	Yb	0.067	0.051	0.400	0.065	0.088	0.210	0.055	0.055	0.052
74	W	0.084	0.057	0.422	0.081	0.095	0.221	0.058	0.057	0.058
80	Hg	0.119	0.067	0.455	0.113	0.107	0.237	0.062	0.061	0.068
83	Bi	0.142	0.073	0.471	0.134	0.113	0.246	0.064	0.062	0.073
88	Ra	0.191	0.083	0.499	0.178	0.124	0.261	0.067	0.064	0.083
90	Th	0.215	0.087	0.510	0.200	0.128	0.267	0.068	0.064	0.087
92	U	0.242	0.092	0.520	0.224	0.133	0.274	0.069	0.065	0.091
96	Cm	0.306	0.102	0.542	0.282	0.142	0.287	0.072	0.066	0.100

TABLE I. *K*-Shell Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_3N_2	M_3N_3
18	Ar		
20	Ca		
25	Mn		
30	Zn		
35	Br	0.015	0.012
36	Kr	0.028	0.031
40	Zr	0.028	0.031
42	Mo	0.032	0.035
45	Rh	0.039	0.042
47	Ag	0.043	0.046
50	Sn	0.050	0.054
52	Te	0.056	p.060
54	Xe	0.061	0.065
56	Ba	0.066	0.070
60	Nd	0.074	0.078
63	Eu	0.079	0.083
67	Ho	0.086	0.088
70	Yb	0.091	0.093
74	W	0.099	0.100
80	Hg	0.112	0.112
83	Bi	0.118	0.119
88	Ra	0.130	0.131
90	Th	0.135	0.135
92	U	0.140	0.140
96	Cm	0.150	0.151

TABLE II. L_1-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	L_2M_1	L_2M_2	L_2M_3	L_2M_4	L_2M_5	L_2N_1	L_2N_2	L_2N_3	L_2N_4
18	Ar	17.780	7.404	7.482						
20	Ca	19.596	9.754	10.804			1.882			
25	Mn		14.525	17.656	23.113	6.410	1.748			
30	Zn		17.852	25.612	20.978	34.015	1.618			
35	Br				20.459	32.727	2.982	1.514	1.505	
36	Kr				19.581	31.107	3.203	1.665	2.200	
40	Zr					7.790	4.343	2.615	3.445	0.449
45	Rh						5.177	3.350	4.359	1.063
47	Ag						5.516	3.628	4.719	1.133
50	Sn						6.202	4.238	5.460	1.415
52	Te						6.644	4.641	5.930	1.591
54	Xe						7.052	5.055	6.396	1.751
56	Ba						7.482	5.464	6.832	1.901
60	Nd						8.199	6.038	7.258	2.010
63	Eu						8.584	6.431	7.495	2.071
67	Ho						8.941	6.925	7.745	2.134
70	Yb							7.308	7.896	2.182
74	W							8.137	8.274	2.331
80	Hg								8.453	2.566
83	Bi									2.656
90	Th									2.709
92	U									
96	Cm									

Z	Element	L_2N_5	L_2N_6	L_2N_7	L_2O_1	L_2O_2	L_2O_3	L_2O_4	L_2O_5	$L_2O_{6,7}$
18	Ar									
20	Ca									
25	Mn									
30	Zn									
35	Br									
36	Kr									
40	Zr				0.499					
45	Rh	1.224			0.229					
47	Ag	1.933			0.228					
50	Sn	2.379			0.701	0.335				
52	Te	2.642			0.873	0.452	0.280			
54	Xe	2.869			1.038	0.556	0.686			
56	Ba	3.076			1.267	0.756	0.920			
60	Nd	3.142	2.991		1.320	0.793	0.927			
63	Eu	3.132	4.902	0.806	1.343	0.810	0.915			
67	Ho	3.083	5.238	4.293	1.366	0.831	0.893			
70	Yb	3.048	5.366	7.015	1.389	0.851	0.877			
74	W	3.122	6.243	8.231	1.658	1.094	1.084	0.173		
80	Hg	3.266	7.051	9.349	2.052	1.472	1.364	0.272	0.360	
83	Bi	3.296	7.251	9.632	2.321	1.703	1.530	0.356	0.467	
90	Th	3.362	7.540	10.062	2.875	2.276	1.877	0.528	0.672	
92	U	3.207	7.546	10.071	3.005	2.424	1.930	0.554	0.694	0.229
96	Cm		7.563	10.128	3.270	2.733	2.029	0.605	0.732	0.608

TABLE II. L_1-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	L_2P_1	L_2P_2	L_2P_3	L_3M_1	L_3M_2	L_3M_3	L_3M_4	L_3M_5	L_3N_1
18	Ar				34.607	7.308	20.792			
20	Ca				38.116	10.461	27.792			3.629
25	Mn				39.113	17.387	37.079	53.337	12.538	3.230
30	Zn				40.266	22.132	47.366	50.604	71.619	2.897
35	Br					25.754	52.799	56.900	81.311	5.052
36	Kr						54.196	57.773	82.495	5.370
40	Zr							59.169	85.317	6.909
45	Rh							66.139	96.654	7.860
47	Ag							59.708	96.945	8.173
50	Sn									8.758
52	Te									9.111
54	Xe									9.422
56	Ba	0.175								9.696
60	Nd	0.167								9.692
63	Eu	0.161								9.610
67	Ho	0.153								9.527
70	Yb	0.149								9.468
74	W	0.187								9.520
80	Hg	0.221						124.015	164.255	9.604
83	Bi	0.320	0.172	0.035				125.897	162.462	9.676
90	Th	0.590	0.406	0.319				124.268	156.147	9.867
92	U	0.602	0.415	0.308			21.328	122.833	153.184	9.925
96	Cm	0.654	0.464	0.312			20.523	119.783	147.191	10.058

Z	Element	L_3N_2	L_3N_3	L_3N_4	L_3N_5	L_3N_6	L_3N_7	L_3O_1	L_3O_2	L_3O_3
18	Ar									
20	Ca									
25	Mn									
30	Zn									
35	Br	1.684	2.732							
36	Kr	1.833	3.926							
40	Zr	2.754	5.712	1.563				0.811		
45	Rh	3.292	6.561	4.222	3.705			0.349		
47	Ag	3.459	6.816	4.711	6.152			0.339		
50	Sn	3.814	7.360	6.219	8.106			1.002	0.304	
52	Te	4.011	7.641	7.154	9.300			1.205	0.394	0.372
54	Xe	4.167	7.694	8.024	10.400			1.365	0.473	0.880
56	Ba	4.285	7.932	8.880	11.477			1.635	0.605	1.127
60	Nd	4.247	7.591	9.727	12.530	4.645		1.593	0.580	1.037
63	Eu	4.182	7.271	10.351	13.265	7.719	1.227	1.549	0.555	0.962
67	Ho	4.079	6.884	11.277	14.266	8.339	6.577	1.500	0.527	0.873
70	Yb	4.014	6.600	11.924	14.961	8.577	10.755	1.464	0.506	0.808
74	W	3.988	6.335	13.083	16.330	10.251	12.871	1.649	0.596	0.929
80	Hg	3.949	5.984	14.905	18.448	11.798	14.741	1.908	0.712	1.060
83	Bi	3.953	5.845	15.799	19.471	12.221	15.212	2.047	0.777	1.141
90	Th	3.974	5.548	17.692	21.551	12.533	15.420	2.347	0.918	1.295
92	U	3.986	5.479	18.182	22.066	12.409	15.205	2.416	0.950	1.314
96	Cm	4.029	5.354	19.003	22.867	12.016	14.594	2.545	1.014	1.347

TABLE II. L_1-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	L_3O_4	L_3O_5	L_3O_6	L_3O_7	L_3P_1	L_3P_2	L_3P_3	M_1M_1	M_1M_2
18	Ar								0.767	1.203
20	Ca								0.920	1.581
25	Mn								0.980	1.752
30	Zn								0.990	1.804
35	Br								1.139	2.157
36	Kr								1.173	2.236
40	Zr								1.298	2.514
45	Rh								1.447	2.840
47	Ag								1.509	2.979
50	Sn								1.596	3.167
52	Te								1.655	3.294
54	Xe								1.715	3.423
56	Ba					0.227			1.774	3.547
60	Nd					0.203			1.893	3.806
63	Eu					0.188			1.989	4.013
67	Ho					0.170			2.117	4.287
70	Yb					0.158			2.222	4.516
74	W	0.939				0.188			2.369	4.840
80	Hg	1.544	1.826			0.205			2.617	5.394
83	Bi	2.056	2.457			0.287	0.080	0.027	2.758	5.710
90	Th	3.182	3.818			0.491	0.170	0.229	3.139	6.592
92	U	3.381	4.037	0.579		0.493	0.169	0.218	3.266	6.892
96	Cm	3.772	4.461	1.353	0.200	0.518	0.179	0.214	3.548	7.564

Z	Element	M_1M_3	M_1M_4	M_1M_5	M_1N_1	M_1N_2	M_1N_3	M_1N_4	M_1N_5	M_1N_6
18	Ar	2.380								
20	Ca	3.116			0.187					
25	Mn	3.415	1.721	0.424	0.159					
30	Zn	3.500	1.960	2.881	0.134					
35	Br	4.155	2.852	4.183	0.246	0.196	0.281			
36	Kr	4.300	3.017	4.422	0.266	0.218	0.415			
40	Zr	4.802	3.581	5.227	0.370	0.350	0.666	0.131		
45	Rh	5.372	4.152	6.029	0.460	0.459	0.859	0.391	0.374	
47	Ag	5.607	4.369	6.327	0.494	0.501	0.932	0.446	0.638	
50	Sn	5.913	4.639	6.688	0.553	0.579	1.070	0.602	0.862	
52	Te	6.114	4.808	6.911	0.594	0.634	1.166	0.700	1.001	
54	Xe	6.315	4.969	7.119	0.636	0.688	1.261	0.793	1.132	
56	Ba	6.499	5.100	7.282	0.677	0.742	1.352	0.881	1.254	
60	Nd	6.862	5.369	7.603	0.739	0.821	1.468	0.970	1.366	0.030
63	Eu	7.141	5.556	7.815	0.785	0.879	1.547	1.025	1.432	0.053
67	Ho	7.476	5.743	8.002	0.843	0.953	1.637	1.083	1.497	0.063
70	Yb	7.740	5.888	8.136	0.891	1.014	1.706	1.124	1.539	0.070
74	W	8.080	6.044	8.248	0.969	1.115	1.828	1.208	1.634	0.091
80	Hg	8.591	6.252	8.346	1.107	1.294	2.033	1.342	1.779	0.120
83	Bi	8.848	6.340	8.354	1.186	1.398	2.141	1.409	1.846	0.133
90	Th	9.455	6.523	8.291	1.402	1.684	2.407	1.560	1.981	0.159
92	U	9.633	6.575	8.258	1.473	1.780	2.485	1.602	2.013	0.165
96	Cm	9.982	6.666	8.152	1.630	1.993	2.641	1.682	2.064	0.174

TABLE II. L_1-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_1N_7	M_1O_1	M_1O_2	M_1O_3	M_1O_4	M_1O_5	$M_1P_{2,3}$	M_2M_3	M_2M_4
18	Ar								0.007	
20	Ca								0.018	
25	Mn								0.041	0.023
30	Zn								0.061	0.029
35	Br								0.087	0.048
36	Kr								0.092	0.054
40	Zr		0.045						0.109	0.071
45	Rh		0.021						0.124	0.095
47	Ag		0.021						0.129	0.107
50	Sn		0.065	0.049					0.133	0.124
52	Te		0.081	0.067	0.060				0.135	0.135
54	Xe		0.097	0.084	0.149				0.136	0.147
56	Ba		0.119	0.113	0.203				0.135	0.160
60	Nd		0.126	0.120	0.209				0.135	0.183
63	Eu	0.008	0.130	0.124	0.211				0.133	0.204
67	Ho	0.046	0.136	0.129	0.212				0.129	0.231
70	Yb	0.080	0.140	0.132	0.212				0.126	0.254
74	W	0.103	0.171	0.172	0.271	0.090			0.122	0.285
80	Hg	0.132	0.225	0.239	0.361	0.146	0.187		0.121	0.335
83	Bi	0.144	0.257	0.281	0.418	0.194	0.248	0.039	0.122	0.361
90	Th	0.165	0.343	0.396	0.560	0.299	0.377	0.172	0.132	0.430
92	U	0.169	0.368	0.430	0.593	0.318	0.396	0.176	0.137	0.451
96	Cm	0.174	0.425	0.506	0.661	0.358	0.435	0.197	0.151	0.494

Z	Element	M_2M_5	M_2N_1	M_2N_4	M_2N_5	M_2N_7	M_2O_1	M_2O_5	M_3M_3	M_3M_4
18	Ar								0.068	
20	Ca		0.140						0.088	
25	Mn	0.072	0.124						0.087	0.452
30	Zn	0.571	0.107						0.085	0.580
35	Br	0.896	0.199						0.101	0.853
36	Kr	0.974	0.216						0.103	0.916
40	Zr	1.197	0.299	0.003			0.035		0.115	1.061
45	Rh	1.456	0.369	0.009	0.064		0.016		0.126	1.184
47	Ag	1.568	0.397	0.011	0.109		0.016		0.130	1.231
50	Sn	1.713	0.443	0.016	0.149		0.050		0.135	1.270
52	Te	1.797	0.475	0.020	0.173		0.062		0.139	1.278
54	Xe	1.890	0.508	0.024	0.197		0.073		0.143	1.290
56	Ba	1.972	0.540	0.027	0.220		0.090		0.146	1.287
60	Nd	2.109	0.589	0.033	0.243		0.095		0.157	1.251
63	Eu	2.230	0.626	0.037	0.261	0.008	0.098		0.166	1.229
67	Ho	2.366	0.674	0.042	0.281	0.048	0.103		0.180	1.172
70	Yb	2.479	0.714	0.046	0.297	0.085	0.106		0.193	1.133
74	W	2.611	0.779	0.052	0.327	0.113	0.130		0.216	1.071
80	Hg	2.802	0.898	0.064	0.377	0.151	0.171	0.036	0.263	0.980
83	Bi	2.899	0.967	0.070	0.405	0.169	0.197	0.049	0.293	0.942
90	Th	3.111	1.162	0.086	0.474	0.204	0.266	0.082	0.383	0.883
92	U	3.177	1.228	0.091	0.495	0.212	0.288	0.089	0.415	0.878
96	Cm	3.300	1.378	0.102	0.539	0.227	0.336	0.103	0.485	0.886

TABLE II. L_1-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_3M_5	M_3N_1	M_3N_3	M_3N_4	M_3O_1	M_4M_4	M_4M_5	M_4N_1	M_4N_2
18	Ar									
20	Ca		0.276							
25	Mn	0.055	0.242				0.043	0.415	0.119	
30	Zn	0.415	0.208				0.058	3.022	0.114	
35	Br	0.607	0.384	0.012			0.113	5.283	0.255	0.006
36	Kr	0.652	0.415	0.017			0.125	5.685	0.282	0.007
40	Zr	0.749	0.571	0.027	0.027	0.067	0.167	7.115	0.413	0.013
45	Rh	0.832	0.689	0.033	0.072	0.031	0.213	8.482	0.524	0.020
47	Ag	0.864	0.747	0.035	0.079	0.031	0.232	8.953	0.563	0.023
50	Sn	0.885	0.828	0.039	0.099	0.093	0.256	9.531	0.628	0.029
52	Te	0.887	0.883	0.041	0.108	0.115	0.270	9.882	0.671	0.034
54	Xe	0.891	0.937	0.044	0.116	0.135	0.285	10.175	0.712	0.038
56	Ba	0.885	0.988	0.047	0.122	0.164	0.298	10.424	0.750	0.043
60	Nd	0.846	1.061	0.051	0.118	0.171	0.321	10.901	0.800	0.051
63	Eu	0.822	1.112	0.054	0.114	0.175	0.338	11.155	0.832	0.057
67	Ho	0.772	1.171	0.058	0.105	0.178	0.355	11.369	0.867	0.065
70	Yb	0.738	1.218	0.063	0.099	0.181	0.367	11.465	0.891	0.071
74	W	0.685	1.291	0.073	0.094	0.215	0.380	11.496	0.926	0.082
80	Hg	0.610	1.413	0.094	0.087	0.269	0.392	11.377	0.981	0.098
83	Bi	0.581	1.475	0.108	0.086	0.299	0.396	11.236	1.007	0.108
90	Th	0.540	1.627	0.151	0.091	0.370	0.399	10.787	1.062	0.131
92	U	0.540	1.671	0.167	0.095	0.388	0.398	10.619	1.077	0.138
96	Cm	0.553	1.757	0.203	0.109	0.424	0.395	10.228	1.105	0.153

Z	Element	M_4N_3	M_4N_4	M_4N_5	M_4N_6	M_4N_7	M_4O_1	M_4O_5	M_5M_5	M_5N_1
18	Ar									
20	Ca									
25	Mn									0.029
30	Zn								0.828	0.167
35	Br	0.055							1.464	0.372
36	Kr	0.085							1.580	0.411
40	Zr	0.141	0.012				0.043		1.987	0.599
45	Rh	0.184	0.040	0.413			0.023		2.383	0.756
47	Ag	0.199	0.047	0.697			0.023		2.519	0.810
50	Sn	0.226	0.066	0.927			0.070		2.687	0.899
52	Te	0.240	0.078	1.066			0.087		2.788	0.956
54	Xe	0.255	0.090	1.191			0.102		2.873	1.011
56	Ba	0.267	0.101	1.308			0.124		2.945	1.061
60	Nd	0.271	0.114	1.405	0.035		0.128		3.076	1.122
63	Eu	0.273	0.122	1.453	0.062	0.022	0.130		3.148	1.157
67	Ho	0.267	0.131	1.500	0.072	0.127	0.131		3.205	1.192
70	Yb	0.262	0.137	1.522	0.079	0.219	0.131		3.228	1.213
74	W	0.257	0.148	1.590	0.101	0.281	0.152		3.230	1.245
80	Hg	0.247	0.164	1.685	0.129	0.353	0.184	0.166	3.178	1.286
83	Bi	0.241	0.171	1.723	0.139	0.381	0.200	0.217	3.129	1.301
90	Th	0.228	0.186	1.788	0.157	0.424	0.236	0.316	2.975	1.320
92	U	0.225	0.189	1.797	0.160	0.430	0.244	0.328	2.919	1.322
96	Cm	0.221	0.195	1.803	0.163	0.434	0.259	0.351	2.791	1.317

TABLE II. L_1-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_5N_2	M_5N_3	M_5N_4	M_5N_5	M_5N_6	M_5N_7	M_5O_1	M_5O_2	M_5O_4
18	Ar									
20	Ca									
25	Mn									
30	Zn									
35	Br	0.076	0.041							
36	Kr	0.088	0.062							
40	Zr	0.154	0.103	0.208				0.070		
45	Rh	0.215	0.135	0.607	0.240			0.033		
47	Ag	0.240	0.146	0.682	0.406			0.033		
50	Sn	0.284	0.164	0.897	0.544			0.101	0.024	
52	Te	0.312	0.175	1.025	0.627			0.124	0.032	
54	Xe	0.342	0.185	1.138	0.703			0.146	0.041	
56	Ba	0.371	0.193	1.243	0.774			0.176	0.055	
60	Nd	0.409	0.193	1.323	0.833	0.109		0.180	0.058	
63	Eu	0.437	0.192	1.360	0.863	0.192	0.019	0.181	0.060	
67	Ho	0.470	0.186	1.390	0.891	0.222	0.109	0.180	0.062	
70	Yb	0.495	0.181	1.400	0.905	0.240	0.187	0.179	0.063	
74	W	0.535	0.174	1.445	0.944	0.304	0.239	0.206	0.080	0.102
80	Hg	0.595	0.163	1.498	0.995	0.380	0.297	0.242	0.107	0.152
83	Bi	0.627	0.157	1.515	1.015	0.408	0.318	0.260	0.123	0.193
90	Th	0.702	0.145	1.530	1.042	0.449	0.349	0.296	0.160	0.269
92	U	0.723	0.143	1.525	1.044	0.454	0.352	0.302	0.169	0.277
96	Cm	0.765	0.139	1.505	1.039	0.455	0.351	0.312	0.188	0.292

Z	Element	M_5O_5	N_1N_1	N_1N_2	N_1N_3	N_1N_4	N_1N_5	N_1O_3	N_2N_5	N_3O_1
18	Ar									
20	Ca		0.009							
25	Mn		0.006							
30	Zn		0.005							
35	Br		0.013	0.018	0.026					
37	Kr		0.015	0.021	0.041					
40	Zr		0.026	0.042	0.080	0.015				0.009
45	Rh		0.035	0.060	0.113	0.049	0.047		0.010	0.005
47	Ag		0.039	0.067	0.125	0.057	0.082		0.018	0.005
50	Sn		0.046	0.082	0.151	0.081	0.116		0.026	0.017
52	Te		0.051	0.092	0.170	0.096	0.138	0.009	0.032	0.022
54	Xe		0.056	0.103	0.189	0.112	0.160	0.022	0.038	0.027
56	Ba		0.062	0.114	0.208	0.127	0.182	0.031	0.044	0.035
60	Nd		0.069	0.129	0.229	0.141	0.201	0.033	0.050	0.037
63	Eu		0.073	0.138	0.243	0.149	0.211	0.033	0.054	0.038
67	Ho		0.080	0.151	0.259	0.158	0.221	0.034	0.059	0.039
70	Yb		0.085	0.162	0.270	0.164	0.228	0.034	0.062	0.040
74	W		0.094	0.181	0.294	0.178	0.244	0.044	0.070	0.049
80	Hg	0.099	0.111	0.217	0.336	0.202	0.271	0.060	0.084	0.064
83	Bi	0.129	0.121	0.239	0.359	0.214	0.284	0.070	0.092	0.073
90	Th	0.186	0.148	0.299	0.417	0.241	0.311	0.097	0.112	0.095
92	U	0.193	0.157	0.320	0.434	0.249	0.318	0.104	0.118	0.101
96	Cm	0.205	0.178	0.366	0.468	0.264	0.329	0.117	0.131	0.114

TABLE II. L_1-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	N_4N_5	N_5N_5
18	Ar		
20	Ca		
25	Mn		
30	Zn		
35	Br		
36	Kr		
40	Zr		
45	Rh	0.032	0.006
47	Ag	0.057	0.017
50	Sn	0.095	0.029
52	Te	0.121	0.037
54	Xe	0.147	0.046
56	Ba	0.174	0.054
60	Nd	0.193	0.060
63	Eu	0.202	0.063
67	Ho	0.211	0.066
70	Yb	0.216	0.068
74	W	0.235	0.074
80	Hg	0.265	0.084
83	Bi	0.280	0.089
90	Th	0.311	0.098
92	U	0.318	0.101
96	Cm	0.330	0.104

TABLE III. L_2-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	L_3M_4	L_3M_5	L_3N_1	L_3N_2	L_3N_3	L_3N_4	L_3N_5	L_3N_6	L_3N_7
25	Mn									
30	Zn			0.700						
36	Kr			0.874	2.468	0.978				
40	Zr			1.024	3.506	1.364	1.509			
45	Rh			1.212	4.106	1.528	4.029	1.035		
47	Ag			1.204	4.333	1.583	4.424	1.682		
50	Sn			1.216	4.769	1.712	5.703	2.151		
52	Te			1.242	5.135	1.828	6.455	2.420		
54	Xe			1.260	5.499	1.934	7.131	2.659		
56	Ba			1.280	5.819	2.018	7.792	2.891		
60	Nd			1.273	6.210	2.103	8.138	2.976	0.126	
63	Eu			1.248	6.403	2.122	8.197	2.962	0.206	0.040
67	Ho			1.205	6.646	2.130	8.153	2.916	0.223	0.214
70	Yb			1.175	6.816	2.139	8.086	2.868	0.234	0.356
74	W			1.159	7.221	2.191	8.280	2.905	0.288	0.438
80	Hg			1.148	7.871	2.245	8.416	2.906	0.348	0.523
88	Ra			1.135	8.793	2.235	8.383	2.836	0.403	0.588
90	Th			1.133	9.035	2.219	8.348	2.811	0.413	0.598
91	Pa		12.250	1.130	9.148	2.206	8.309	2.791	0.416	0.600
92	U		13.448	1.127	9.264	2.190	8.267	2.771	0.420	0.602
94	Pu	41.363	13.031	1.120	9.491	2.153	8.170	2.727	0.425	0.604
96	Cm	39.914	12.575	1.113	9.721	2.108	8.059	2.680	0.429	0.603

Z	Element	L_3O_1	L_3O_2	L_3O_3	L_3O_4	L_3O_5	$L_3P_{2,3}$	M_1M_1	M_1M_2	M_1M_3
25	Mn							0.085	1.581	0.121
30	Zn							0.083	1.571	0.126
36	Kr							0.093	1.876	0.160
40	Zr	0.124						0.099	2.080	0.184
45	Rh	0.049						0.105	2.325	0.212
47	Ag	0.046						0.107	2.424	0.222
50	Sn	0.130	0.394					0.110	2.568	0.237
52	Te	0.154	0.524	0.093				0.111	2.665	0.248
54	Xe	0.176	0.645	0.228				0.113	2.762	0.258
56	Ba	0.206	0.846	0.303				0.114	2.858	0.268
60	Nd	0.197	0.853	0.296				0.117	3.056	0.289
63	Eu	0.188	0.847	0.286				0.118	3.213	0.304
67	Ho	0.178	0.840	0.274				0.119	3.426	0.323
70	Yb	0.172	0.842	0.265				0.121	3.600	0.338
74	W	0.194	1.053	0.324	0.602			0.122	3.846	0.357
80	Hg	0.221	1.360	0.394	0.888	0.297		0.124	4.266	0.387
88	Ra	0.256	1.835	0.487	1.436	0.486	0.372	0.126	4.959	0.429
90	Th	0.263	1.954	0.504	1.540	0.520	0.445	0.127	5.162	0.441
91	Pa	0.266	2.003	0.506	1.556	0.524	0.435	0.128	5.272	0.446
92	U	0.268	2.054	0.510	1.581	0.532	0.443	0.128	5.383	0.452
94	Pu	0.272	2.149	0.512	1.611	0.539	0.437	0.129	5.621	0.463
96	Cm	0.284	2.247	0.513	1.650	0.550	0.471	0.129	5.878	0.475

TABLE III. L_2-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_1M_4	M_1M_5	M_1N_2	M_1N_3	M_1N_4	M_1O_2	M_2M_2	M_2M_3	M_2M_4
25	Mn	0.102	0.026					1.339	4.653	1.579
30	Zn	0.087	0.172					1.364	4.685	1.747
36	Kr	0.111	0.252	0.141	0.014			1.724	5.804	2.741
40	Zr	0.127	0.294	0.215	0.024			1.956	6.481	3.280
45	Rh	0.153	0.336	0.270	0.031			2.231	7.241	3.834
47	Ag	0.169	0.351	0.290	0.034			2.341	7.534	4.040
50	Sn	0.193	0.369	0.329	0.039			2.500	7.931	4.308
52	Te	0.208	0.479	0.355	0.043		0.035	2.610	8.192	4.477
54	Xe	0.228	0.388	0.382	0.046	0.025	0.044	2.718	8.442	4.636
56	Ba	0.249	0.396	0.408	0.050	0.030	0.058	2.825	8.679	4.778
60	Nd	0.291	0.408	0.445	0.055	0.037	0.061	3.053	9.142	5.051
63	Eu	0.331	0.415	0.472	0.059	0.043	0.062	3.233	9.490	5.248
67	Ho	0.391	0.419	0.508	0.063	0.052	0.064	3.474	9.904	5.463
70	Yb	0.444	0.421	0.537	0.067	0.059	0.065	3.674	10.229	5.626
74	W	0.523	0.418	0.587	0.073	0.073	0.084	3.961	10.648	5.821
80	Hg	0.671	0.408	0.675	0.082	0.100	0.115	4.450	11.280	6.097
88	Ra	0.921	0.386	0.824	0.092	0.151	0.170	5.260	12.145	6.453
90	Th	0.990	0.378	0.868	0.101	0.166	0.186	5.502	12.365	6.541
91	Pa	1.028	0.374	0.892	0.103	0.174	0.194	5.637	12.485	6.595
92	U	1.066	0.370	0.916	0.105	0.183	0.202	5.767	12.595	6.638
94	Pu	1.145	0.362	0.967	0.110	0.201	0.218	6.054	12.826	6.736
96	Cm	1.227	0.353	1.022	0.114	0.220	0.236	6.365	13.057	6.832

Z	Element	M_2M_5	M_2N_1	M_2N_2	M_2N_3	M_2N_4	M_2N_5	M_2N_6	M_2N_7	M_2O_1
25	Mn	0.513	0.145							
30	Zn	3.314	0.119							
36	Kr	5.061	0.245	0.301	0.551					
40	Zr	5.940	0.346	0.481	0.884	0.119				
45	Rh	6.790	0.436	0.629	1.138	0.359	0.420			
47	Ag	7.093	0.470	0.685	1.230	0.411	0.715			
50	Sn	7.456	0.529	0.791	1.411	0.557	0.960			0.063
52	Te	7.680	0.570	0.865	1.535	0.650	1.112			0.080
54	Xe	7.878	0.612	0.939	1.656	0.738	1.253			0.095
56	Ba	8.034	0.653	1.013	1.774	0.823	1.389			0.118
60	Nd	8.321	0.717	1.123	1.922	0.911	1.499	0.027		0.126
63	Eu	8.503	0.763	1.204	2.019	0.967	1.563	0.047	0.006	0.130
67	Ho	8.640	0.822	1.311	2.132	1.030	1.623	0.056	0.033	0.136
70	Yb	8.728	0.870	1.397	2.216	1.074	1.659	0.061	0.056	0.141
74	W	8.780	0.949	1.542	2.369	1.164	1.747	0.079	0.072	0.173
80	Hg	8.749	1.089	1.800	2.622	1.309	1.873	0.103	0.091	0.228
88	Ra	8.526	1.319	2.235	2.990	1.512	2.002	0.128	0.106	0.323
90	Th	8.439	1.387	2.365	3.086	1.564	2.025	0.133	0.108	0.350
91	Pa	8.405	1.424	2.436	3.138	1.590	2.036	0.135	0.109	0.364
92	U	8.350	1.459	2.505	3.185	1.616	2.044	0.136	0.110	0.378
94	Pu	8.246	1.537	2.657	3.284	1.668	2.057	0.140	0.110	0.406
96	Cm	8.126	1.621	2.821	3.384	1.720	2.066	0.142	0.110	0.437

TABLE III. L_2-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_2O_2	M_2O_3	M_2O_4	M_2O_5	$M_2P_{2,3}$	M_3M_3	M_3M_4	M_3M_5	M_3N_1
25	Mn						0.128	1.790	0.046	0.01
30	Zn						0.131	2.049	0.301	0.009
36	Kr						0.160	3.285	0.460	0.019
40	Zr						0.177	3.977	0.546	0.027
45	Rh						0.196	4.643	0.628	0.035
47	Ag						0.202	4.854	0.654	0.038
50	Sn	0.066					0.211	5.125	0.688	0.043
52	Te	0.089	0.079				0.217	5.291	0.710	0.047
54	Xe	0.112	0.195				0.223	5.422	0.727	0.050
56	Ba	0.151	0.265				0.227	5.529	0.742	0.054
60	Nd	0.160	0.273				0.237	5.731	0.771	0.059
63	Eu	0.166	0.275				0.244	5.818	0.786	0.063
67	Ho	0.173	0.275				0.251	5.865	0.799	0.068
70	Yb	0.178	0.275				0.256	5.861	0.804	0.071
74	W	0.232	0.350	0.086			0.262	5.801	0.806	0.077
80	Hg	0.324	0.464	0.142	0.196		0.267	5.613	0.799	0.085
88	Ra	0.490	0.663	0.269	0.353	0.103	0.267	5.216	0.774	0.094
90	Th	0.539	0.715	0.300	0.386	0.126	0.265	5.102	0.766	0.102
91	Pa	0.563	0.736	0.309	0.393	0.222	0.264	5.047	0.763	0.104
92	U	0.587	0.757	0.321	0.403	0.230	0.263	4.981	0.758	0.105
94	Pu	0.637	0.799	0.342	0.418	0.232	0.260	4.853	0.749	0.109
96	Cm	0.693	0.843	0.366	0.436	0.258	0.257	4.718	0.738	0.113

Z	Element	M_3N_2	M_3N_3	M_3N_4	M_3N_5	M_3O_2	M_3O_4	M_4M_4	M_4M_5	M_4N_1
25	Mn							1.253	0.953	0.009
30	Zn							1.502	6.780	0.006
36	Kr	0.449	0.027					2.818	12.528	0.014
40	Zr	0.694	0.041	0.132				3.531	15.531	0.021
45	Rh	0.873	0.052	0.388	0.032			4.223	18.358	0.029
47	Ag	0.938	0.056	0.437	0.054			4.469	19.340	0.033
50	Sn	1.059	0.064	0.581	0.072	0.086		4.774	20.500	0.039
52	Te	1.142	0.069	0.668	0.084	0.114		4.935	21.083	0.044
54	Xe	1.221	0.074	0.746	0.094	0.141		5.092	21.648	0.050
56	Ba	1.297	0.079	0.820	0.103	0.186		5.225	22.090	0.056
60	Nd	1.395	0.084	0.880	0.111	0.191		5.411	22.604	0.067
63	Eu	1.461	0.088	0.909	0.116	0.193		5.529	22.895	0.078
67	Ho	1.539	0.092	0.935	0.120	0.194		5.603	22.933	0.093
70	Yb	1.599	0.094	0.945	0.123	0.196		5.630	22.832	0.107
74	W	1.699	0.099	0.977	0.129	0.244	0.071	5.591	22.370	0.129
80	Hg	1.864	0.106	1.018	0.139	0.318	0.108	5.447	21.329	0.170
88	Ra	2.097	0.113	1.043	0.150	0.434	0.180	5.112	19.399	0.244
90	Th	2.158	0.114	1.044	0.152	0.463	0.194	4.995	18.793	0.265
91	Pa	2.190	0.115	1.044	0.153	0.476	0.197	4.934	18.480	0.277
92	U	2.219	0.115	1.042	0.154	0.489	0.201	4.877	18.192	0.289
94	Pu	2.281	0.115	1.038	0.155	0.514	0.206	4.748	17.553	0.313
96	Cm	2.342	0.115	1.031	0.157	0.539	0.213	4.608	16.879	0.339

TABLE III. L_2-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_4N_2	M_4N_3	M_4N_4	M_4N_5	M_4N_6	M_4N_7	M_4O_2	M_4O_3	M_4O_4
25	Mn									
30	Zn									
36	Kr	0.210	0.305							
40	Zr	0.349	0.525	0.230						
45	Rh	0.460	0.700	0.696	1.058					
47	Ag	0.500	0.758	0.794	1.804					
50	Sn	0.572	0.871	1.066	2.428			0.047		
52	Te	0.619	0.942	1.231	2.803			0.062	0.048	
54	Xe	0.664	1.008	1.384	3.146			0.077	0.118	
56	Ba	0.707	1.071	1.527	3.465			0.102	0.159	
60	Nd	0.760	1.132	1.648	3.698	0.110		0.105	0.159	
63	Eu	0.793	1.159	1.713	3.810	0.193	0.050	0.106	0.155	
67	Ho	0.829	1.178	1.765	3.883	0.222	0.282	0.105	0.151	
70	Yb	0.854	1.180	1.791	3.900	0.240	0.485	0.105	0.145	
74	W	0.895	1.190	1.857	3.995	0.304	0.613	0.129	0.174	0.135
80	Hg	0.958	1.193	1.936	4.085	0.375	0.751	0.164	0.208	0.205
88	Ra	1.045	1.160	1.976	4.049	0.428	0.845	0.216	0.253	0.340
90	Th	1.067	1.145	1.970	4.003	0.434	0.853	0.229	0.261	0.365
91	Pa	1.079	1.136	1.965	3.977	0.436	0.855	0.234	0.262	0.370
92	U	1.090	1.127	1.960	3.949	0.437	0.855	0.240	0.263	0.376
94	Pu	1.114	1.106	1.943	3.881	0.437	0.850	0.251	0.264	0.384
96	Cm	1.138	1.083	1.920	3.800	0.434	0.840	0.262	0.264	0.394

Z	Element	M_4O_5	M_5M_5	M_5N_2	M_5N_3	M_5N_4	M_5N_5	$M_5N_{6,7}$	M_5O_2	M_5O_4
25	Mn									
30	Zn		0.321							
36	Kr		0.592	0.362	0.040					
40	Zr		0.736	0.580	0.067	0.459				
45	Rh		0.872	0.737	0.088	1.336	0.093			
47	Ag		0.918	0.791	0.094	1.505	0.158			
50	Sn		0.974	0.888	0.108	1.982	0.212		0.071	
52	Te		1.003	0.948	0.117	2.261	0.244		0.093	
54	Xe		1.031	1.005	0.125	2.513	0.274		0.114	
56	Ba		1.054	1.056	0.133	2.744	0.302		0.148	
60	Nd		1.084	1.107	0.141	2.904	0.323	0.044	0.148	
63	Eu		1.100	1.135	0.145	2.979	0.333	0.080	0.146	
67	Ho		1.108	1.156	0.149	3.024	0.341	0.109	0.142	
70	Yb		1.106	1.168	0.151	3.035	0.344	0.130	0.139	
74	W		1.089	1.188	0.156	3.099	0.354	0.164	0.166	0.219
80	Hg	0.418	1.046	1.208	0.161	3.162	0.365	0.201	0.199	0.322
88	Ra	0.697	0.960	1.206	0.167	3.142	0.367	0.228	0.240	0.516
90	Th	0.746	0.933	1.200	0.167	3.110	0.364	0.231	0.247	0.550
91	Pa	0.751	0.919	1.196	0.168	3.091	0.362	0.231	0.249	0.555
92	U	0.760	0.905	1.191	0.168	3.073	0.360	0.232	0.251	0.563
94	Pu	0.768	0.876	1.179	0.168	3.026	0.356	0.231	0.254	0.571
96	Cm	0.780	0.845	1.164	0.168	2.969	0.350	0.230	0.256	0.580

TABLE III. L_2-Shell Coster–Kronig and Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	N_1N_2	N_2N_2	N_2N_3	N_2N_4	N_2N_5	N_2O_2	N_2O_3	N_3N_4	N_3O_2
25	Mn									
30	Zn									
36	Kr	0.019	0.013	0.043						
40	Zr	0.036	0.029	0.095	0.013				0.018	
45	Rh	0.051	0.043	0.137	0.043	0.046			0.059	
47	Ag	0.057	0.049	0.153	0.051	0.081			0.069	
50	Sn	0.068	0.061	0.189	0.074	0.116			0.100	
52	Te	0.077	0.069	0.214	0.089	0.139			0.120	
54	Xe	0.086	0.078	0.239	0.105	0.162			0.140	
56	Ba	0.094	0.087	0.265	0.121	0.185	0.026	0.040	0.161	0.038
60	Nd	0.106	0.099	0.292	0.136	0.202	0.028	0.042	0.176	0.041
63	Eu	0.113	0.107	0.309	0.144	0.212	0.029	0.042	0.184	0.041
67	Ho	0.123	0.118	0.328	0.154	0.220	0.031	0.042	0.191	0.042
70	Yb	0.131	0.127	0.343	0.161	0.225	0.032	0.042	0.194	0.043
74	W	0.146	0.143	0.373	0.177	0.240	0.043	0.055	0.205	0.055
80	Hg	0.174	0.173	0.426	0.204	0.263	0.062	0.075	0.222	0.075
38	Ra	0.221	0.226	0.505	0.243	0.289	0.098	0.112	0.239	0.108
90	Th	0.235	0.242	0.526	0.253	0.294	0.109	0.122	0.242	0.117
91	Pa	0.243	0.251	0.537	0.258	0.296	0.115	0.126	0.243	0.121
92	U	0.251	0.260	0.547	0.263	0.298	0.120	0.130	0.244	0.125
94	Pu	0.267	0.278	0.569	0.274	0.301	0.132	0.139	0.245	0.133
96	Cm	0.284	0.298	0.591	0.284	0.304	0.145	0.147	0.246	0.141

Z	Element	N_4N_4	N_4N_5
25	Mn		
30	Zn		
36	Kr		
40	Zr		
45	Rh	0.029	0.079
47	Ag	0.036	0.145
50	Sn	0.060	0.243
52	Te	0.077	0.311
54	Xe	0.094	0.379
56	Ba	0.112	0.446
60	Nd	0.125	0.492
63	Eu	0.132	0.513
67	Ho	0.139	0.530
70	Yb	0.142	0.536
74	W	0.154	0.571
80	Hg	0.172	0.623
88	Ra	0.191	0.670
90	Th	0.195	0.676
91	Pa	0.196	0.678
92	U	0.197	0.679
94	Pu	0.200	0.680
96	Cm	0.201	0.678

TABLE IV. L_3-Shell Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_1M_1	M_1M_2	M_1M_3	M_1M_4	M_1M_5	M_1N_3	M_1N_4	M_1N_5	M_1N_7
18	Ar	0.062	0.041	1.293						
20	Ca	0.079	0.053	1.599						
25	Mn	0.086	0.057	1.648	0.109	0.027				
30	Zn	0.085	0.058	1.644	0.120	0.154				
36	Kr	0.099	0.071	1.974	0.176	0.206	0.148			
40	Zr	0.108	0.078	2.199	0.206	0.231	0.228			
45	Rh	0.118	0.086	2.467	0.240	0.264	0.285			
47	Ag	0.122	0.088	2.578	0.254	0.281	0.307			
50	Sn	0.127	0.090	2.734	0.274	0.307	0.349			
52	Te	0.131	0.091	2.837	0.286	0.323	0.378			
54	Xe	0.135	0.092	2.942	0.300	0.343	0.407			
56	Ba	0.138	0.093	3.049	0.312	0.362	0.436			
60	Nd	0.144	0.094	3.258	0.339	0.404	0.473			
63	Eu	0.148	0.094	3.423	0.363	0.449	0.500	0.033	0.036	
67	Ho	0.153	0.092	3.645	0.396	0.515	0.534	0.036	0.042	0.020
70	Yb	0.155	0.089	3.822	0.427	0.585	0.561	0.039	0.047	0.038
74	W	0.156	0.085	4.068	0.474	0.695	0.609	0.045	0.059	0.055
80	Hg	0.153	0.076	4.476	0.566	0.930	0.693	0.058	0.085	0.085
83	Bi	0.150	0.070	4.704	0.625	1.034	0.742	0.066	0.105	0.104
90	Th	0.132	0.055	5.293	0.812	1.582	0.869	0.095	0.171	0.159
92	U	0.124	0.050	5.489	0.882	1.771	0.911	0.105	0.198	0.179
96	Cm	0.104	0.041	5.897	1.051	2.230	0.999	0.132	0.266	0.224

Z	Element	M_1O_3	M_2M_3	M_2M_4	M_2M_5	M_2N_3	M_2N_5	M_2N_7	M_2O_3	M_3M_3
18	Ar		1.719							2.548
20	Ca		2.310							3.438
25	Mn		2.489	0.097	0.158					3.655
30	Zn		2.536	0.115	1.086					3.700
36	Kr		3.189	0.190	1.737	0.244				4.617
40	Zr		3.599	0.233	2.103	0.383				5.183
45	Rh		4.084	0.275	2.460	0.486	0.131			5.830
47	Ag		4.286	0.289	2.576	0.525	0.220			6.091
50	Sn		4.563	0.308	2.726	0.601	0.293			6.440
53	Te		4.749	0.318	2.818	0.653	0.337			6.672
54	Xe		4.935	0.327	2.893	0.705	0.376			6.897
56	Ba	0.061	5.121	0.336	2.966	0.757	0.413		0.107	7.117
60	Nd	0.063	5.478	0.349	3.084	0.824	0.441		0.111	7.527
63	Eu	0.064	5.767	0.357	3.143	0.872	0.454		0.112	7.844
67	Ho	0.065	6.147	0.363	3.197	0.934	0.463	0.032	0.113	8.246
70	Yb	0.065	6.447	0.367	3.206	0.981	0.466	0.059	0.115	8.547
74	W	0.084	6.867	0.369	3.195	1.066	0.478	0.082	0.148	8.951
80	Hg	0.114	7.552	0.372	3.128	1.214	0.491	0.120	0.200	9.572
83	Bi	0.133	7.933	0.375	3.082	1.298	0.493	0.141	0.234	9.902
90	Th	0.184	8.905	0.392	2.938	1.518	0.485	0.196	0.323	10.687
92	U	0.197	9.235	0.402	2.901	1.589	0.479	0.213	0.347	10.943
96	Cm	0.226	9.903	0.431	2.818	1.740	0.464	0.249	0.396	11.429

TABLE IV. L_3-Shell Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_3M_4	M_3M_5	M_3N_1	M_3N_2	M_3N_3	M_3N_4	M_3N_5	M_3N_6	M_3N_7
18	Ar									
20	Ca			0.182						
25	Mn	2.336	0.579	0.151						
30	Zn	2.583	3.874	0.124						
36	Kn	4.052	6.153	0.256	0.300	0.793				
40	Zr	4.861	7.413	0.363	0.484	1.260	0.173			
45	Rh	5.718	8.720	0.459	0.633	1.612	0.522	0.522		
47	Ag	6.052	9.207	0.495	0.690	1.742	0.598	0.694		
50	Sn	6.492	9.838	0.558	0.797	1.994	0.813	1.216		
52	Te	6.774	10.232	0.602	0.870	2.166	0.951	1.418		
54	Xe	7.051	10.607	0.645	0.943	2.335	1.084	1.611		
56	Ba	7.319	10.961	0.691	1.017	2.506	1.213	1.797		
60	Nd	7.814	11.590	0.755	1.116	2.708	1.354	1.978		
63	Eu	8.195	12.038	0.802	1.189	2.847	1.447	2.091	0.072	0.012
67	Ho	8.660	12.552	0.865	1.281	3.017	1.556	2.215	0.088	0.070
70	Yb	9.004	12.895	0.912	1.352	3.138	1.637	2.300	0.100	0.125
74	W	9.458	13.300	0.900	1.470	3.361	1.793	2.477	0.135	0.167
80	Hg	10.132	13.814	1.124	1.671	3.734	2.054	2.759	0.188	0.229
83	Bi	10.485	14.053	1.199	1.782	3.938	2.192	2.902	0.215	0.259
90	Th	11.317	14.512	1.396	2.069	4.436	2.535	3.229	0.278	0.327
92	U	11.591	14.660	1.461	2.160	4.594	2.636	3.318	0.296	0.345
96	Cm	12.100	14.873	1.593	2.349	4.899	2.843	3.492	0.332	0.380

Z	Element	M_3O_1	M_3O_2	M_3O_3	M_3O_4	M_3O_5	M_4M_4	M_4M_5	M_4N_1	M_4N_2
18	Ar									
20	Ca									
25	Mn						0.217	0.735	0.010	
30	Zn						0.264	5.324	0.009	
36	Kr						0.512	10.126	0.021	0.018
40	Zr						0.657	12.848	0.031	0.032
45	Rh						0.809	15.694	0.041	0.044
47	Ag						0.866	16.735	0.044	0.048
50	Sn	0.067	0.067				0.945	18.165	0.051	0.055
52	Te	0.084	0.091	0.109			0.990	18.994	0.055	0.060
54	Xe	0.101	0.114	0.270			1.037	19.841	0.060	0.064
56	Ba	0.124	0.154	0.366			1.077	20.562	0.065	0.069
60	Nd	0.132	0.162	0.376			1.155	21.938	0.072	0.074
63	Eu	0.137	0.166	0.379			1.211	22.938	0.078	0.077
67	Ho	0.143	0.171	0.380			1.270	23.983	0.086	0.079
70	Yb	0.147	0.175	0.380			1.317	24.807	0.094	0.081
74	W	0.180	0.225	0.484	0.133		1.366	25.663	0.106	0.085
80	Hg	0.234	0.305	0.642	0.222	0.287	1.432	26.791	0.129	0.090
83	Bi	0.267	0.354	0.744	0.299	0.386	1.460	27.253	0.144	0.094
90	Th	0.351	0.480	0.993	0.431	0.607	1.519	28.264	0.187	0.105
92	U	0.376	0.514	1.054	0.518	0.645	1.533	28.471	0.203	0.110
96	Cm	0.427	0.587	1.176	0.598	0.725	1.561	28.952	0.238	0.121

TABLE IV. L_3-Shell Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_4N_3	M_4N_4	M_4N_5	M_4N_6	M_4N_7	M_4O_3	M_4O_5	M_5M_5	M_5N_1
18	Ar									
20	Ca									
25	Mn									
30	Zn								3.596	0.011
36	Kr	0.297							6.885	0.025
40	Zr	0.492	0.043						8.745	0.036
45	Rh	0.644	0.134	0.764					10.685	0.046
47	Ag	0.699	0.155	1.305					11.398	0.051
50	Sn	0.805	0.212	1.769					12.364	0.060
52	Te	0.875	0.248	2.053					12.920	0.065
54	Xe	0.944	0.282	2.322			0.105		13.486	0.072
56	Ba	1.011	0.315	2.576			0.141		13.964	0.079
60	Nd	1.095	0.350	2.822			0.145		14.858	0.091
63	Eu	1.151	0.372	2.974	0.041	0.018	0.146		15.507	0.102
67	Ho	1.217	0.395	3.135	0.050	0.106	0.146		16.176	0.119
70	Yb	1.266	0.412	3.249	0.056	0.189	0.146		16.705	0.136
74	W	1.349	0.443	3.478	0.075	0.255	0.184		17.226	0.164
80	Hg	1.488	0.492	3.842	0.103	0.347	0.241	0.378	17.903	0.222
83	Bi	1.561	0.516	4.018	0.117	0.392	0.276	0.504	18.169	0.261
90	Th	1.741	0.568	4.415	0.148	0.490	0.363	0.773	18.727	0.383
92	U	1.794	0.582	4.519	0.157	0.517	0.382	0.817	18.837	0.429
96	Cm	1.904	0.607	4.724	0.173	0.565	0.423	0.909	19.098	0.535

Z	Element	M_5N_2	M_5N_3	M_5N_4	M_5N_5	M_5N_6	M_5N_7	M_5O_2	M_5O_3	M_5O_4
18	Ar									
20	Ca									
25	Mn									
30	Zn									
36	Kr	0.159	0.485							
40	Zr	0.272	0.817	0.426						
45	Rh	0.364	1.083	1.313	1.131					
47	Ag	0.396	1.178	1.510	1.945					
50	Sn	0.453	1.358	2.058	2.655			0.038		
52	Te	0.490	1.476	2.400	3.096			0.051	0.073	
54	Xe	0.523	1.592	2.728	3.516			0.063	0.181	
56	Ba	0.556	1.703	3.040	3.915			0.084	0.244	
60	Nd	0.591	1.834	3.362	4.303	0.234		0.085	0.250	
63	Eu	0.608	1.914	3.562	4.544	0.425	0.051	0.084	0.249	
67	Ho	0.623	2.000	3.773	4.798	0.513	0.305	0.082	0.246	
70	Yb	0.629	2.057	3.921	4.975	0.575	0.545	0.081	0.244	
74	W	0.638	2.155	4.204	5.325	0.767	0.733	0.097	0.303	0.307
80	Hg	0.645	2.304	4.642	5.877	1.038	0.997	0.116	0.385	0.489
83	Bi	0.644	2.374	4.852	6.141	1.169	1.125	0.126	0.435	0.643
90	Th	0.636	2.525	5.309	6.726	1.454	1.403	0.145	0.544	0.973
92	U	0.633	2.563	5.429	6.881	1.530	1.477	0.148	0.566	1.030
96	Cm	0.626	2.633	5.650	7.174	1.665	1.608	0.154	0.606	1.145

TABLE IV. L_3-Shell Auger Transition Probabilities (in milliatomic units)

See page 17 for Explanation of Tables

Z	Element	M_5O_5	N_1N_3	N_2N_3	N_2N_5	N_3N_3	N_3N_4	N_3N_5	N_3O_3	N_4N_5
18	Ar									
20	Ca									
25	Mn									
30	Zn									
36	Kr		0.019	0.023		0.034				
40	Zr		0.038	0.052		0.076	0.018			
45	Rh		0.054	0.077	0.020	0.109	0.059	0.065		0.066
47	Ag		0.059	0.086	0.035	0.122	0.070	0.114		0.122
50	Sn		0.072	0.107	0.050	0.151	0.102	0.167		0.208
52	Te		0.081	0.122	0.060	0.172	0.124	0.203		0.270
54	Xe		0.090	0.137	0.070	0.193	0.146	0.240	0.044	0.333
56	Ba		0.100	0.153	0.080	0.215	0.169	0.276	0.062	0.398
60	Nd		0.111	0.171	0.088	0.236	0.191	0.309	0.065	0.452
63	Eu		0.118	0.183	0.091	0.250	0.204	0.328	0.066	0.484
67	Ho		0.128	0.198	0.095	0.267	0.220	0.348	0.067	0.518
70	Yb		0.135	0.210	0.096	0.278	0.231	0.361	0.067	0.540
74	W		0.149	0.232	0.101	0.304	0.257	0.395	0.087	0.600
80	Hg	0.593	0.175	0.274	0.108	0.350	0.304	0.452	0.119	0.703
83	Bi	0.791	0.190	0.297	0.110	0.376	0.329	0.482	0.141	0.757
90	Th	1.216	0.231	0.360	0.114	0.441	0.394	0.552	0.196	0.881
92	U	1.286	0.243	0.379	0.114	0.461	0.412	0.571	0.209	0.916
96	Cm	1.428	0.271	0.421	0.114	0.502	0.452	0.608	0.238	0.982

Z	Element	N_5N_5	N_5N_6	N_5N_7	N_5O_3	N_5O_4	N_5O_5
18	Ar						
20	Ca						
25	Mn						
30	Zn						
36	Kr						
40	Zr						
45	Rh	0.028					
47	Ag	0.085					
50	Sn	0.145					
52	Te	0.189					
54	Xe	0.233					
56	Ba	0.279			0.040		
60	Nd	0.316			0.042		
63	Eu	0.338	0.044	0.005	0.043		
67	Ho	0.361	0.054	0.032	0.043		
70	Yb	0.375	0.060	0.056	0.043		
74	W	0.417	0.082	0.078	0.056	0.044	
80	Hg	0.489	0.117	0.111	0.076	0.074	0.099
83	Bi	0.526	0.135	0.128	0.088	0.101	0.136
90	Th	0.613	0.177	0.169	0.119	0.162	0.222
92	U	0.638	0.188	0.179	0.126	0.175	0.239
96	Cm	0.684	0.210	0.200	0.140	0.200	0.272