

**X-Ray Data Booklet**

*Photon energies and relative intensities of K-, L-, and M-shell lines shown in Fig. 1-1, arranged by intensity of 100 is assigned to the strongest line in each shell for each element.*

Energy (eV)	Element	Line	Relative intensity									
54.3	3 Li	$K\alpha_{1,2}$	150	524.9	8 O	$K\alpha$		$\beta$	851.5	28 Ni	$L\alpha_{1,2}$	111
108.5	4 Be	$K\alpha_{1,2}$	150						868.8	28 Ni	$L\beta_1$	68
183.3	5 B	$K\alpha_{1,2}$	151									
277	6 C	$K\alpha_{1,2}$	147									
348.3	21 Sc	Ll	21									
392.4	7 N	$K\alpha_{1,2}$	150									
395.3	22 Ti	Ll	46	676.8	9 F	$K\alpha_{1,2}$	148					
395.4	21 Sc	$L\alpha_{1,2}$	111	677.8	27 Co	Ll	10					
399.6	21 Sc	$L\beta_1$	77	705.0	26 Fe	$L\alpha_{1,2}$	111					
446.5	23 V	Ll	28	718.5	26 Fe	$L\beta_1$	66					
452.2	22 Ti	$L\alpha_{1,2}$	111	742.7	28 Ni	Ll	9					
458.4	22 Ti	$L\beta_1$	79	776.2	27 Co	$L\alpha_{1,2}$	111					
500.3	24 Cr	Ll	17	791.4	27 Co	$L\beta_1$	76					
511.3	23 V	$L\alpha_{1,2}$	111	811.1	29 Cu	Ll	8					
519.2	23 V	$L\beta_1$	80	833	57 La	$M\alpha_1$	100					
				848.6	10 Ne	$K\alpha_{1,2}$	150					

*Energies and intensities of x-ray emission lines (continued).*

<b>Energy (eV)</b>	<b>Element</b>	<b>Line</b>	<b>Relative intensity</b>								
1,131	63 Eu	M $\alpha_1$	100	1,462	69 Tm	M $\alpha_1$	100	1,740.0	14 Si	K $\alpha_1$	100
1,185	64 Gd	M $\alpha_1$	100	1,480.4	35 Br	L $\alpha_{1,2}$	111	1,752.2	37 Rb	L $\beta_1$	58
1,188.0	32 Ge	L $\alpha_{1,2}$	111	1,482.4	37 Rb	Ll	5	1,775.4	74 W	M $\alpha_1$	100
1,204.4	34 Se	Ll	6	1,486.3	13 Al	K $\alpha_2$	50	1,792.0	40 Zr	Ll	5
1,218.5	32 Ge	L $\beta_1$	60	1,486.7	13 Al	K $\alpha_1$	100	1,804.7	38 Sr	L $\alpha_2$	11
1,240	65 Tb	M $\alpha_1$	100	1,521.4	70 Yb	M $\alpha_1$	100	1,806.6	38 Sr	L $\alpha_1$	100
1,253.6	12 Mg	K $\alpha_{1,2}$	150	1,525.9	35 Br	L $\beta_1$	59	1,835.9	14 Si	K $\beta_1$	2
1,282.0	33 As	L $\alpha_{1,2}$	111	1,557.4	13 Al	K $\beta_1$	1	1,842.5	75 Re	M $\alpha_1$	100
1,293	66 Dy	M $\alpha_1$	100	1,581.3	71 Lu	M $\alpha_1$	100	1,871.7	38 Sr	L $\beta_1$	58
1,293.5	35 Br	Ll	5	1,582.2	38 Sr	Ll	5	1,902.2	41 Nb	Ll	5
1,317.0	33 As	L $\beta_1$	60	1,586.0	36 Kr	L $\alpha_{1,2}$	111	1,910.2	76 Os	M $\alpha_1$	100
1,348	67 Ho	M $\alpha_1$	100	1,636.6	36 Kr	L $\beta_1$	57	1,920.5	39 Y	L $\alpha_2$	11
1,379.1	34 Se	L $\alpha_{1,2}$	111	1,644.6	72 Hf	M $\alpha_1$	100	1,922.6	39 Y	L $\alpha_1$	100
1,386	36 Kr	Ll	5	1,685.4	39 Y	Ll	5	1,979.9	77 Ir	M $\alpha_1$	100
1,406	68 Er	M $\alpha_1$	100	1,692.6	37 Rb	L $\alpha_2$	11	1,995.8	39 Y	L $\beta_1$	57
1,419.2	34 Se	L $\beta_1$	59	1,694.1	37 Rb	L $\alpha_1$	100	2,012.7	15 P	K $\alpha_2$	50
				1,709.6	73 Ta	M $\alpha_1$	100	2,013.7	15 P	K $\alpha_1$	100
				1,739.4	14 Si	K $\alpha_2$	50	2,015.7	42 Mo	Ll	5

2,039.9	40 Zr	L $\alpha_2$	11	2,367.0	41 Nb	L $\beta_{2,15}$	3	2,696.7	45 Rh	L $\alpha_1$	2,558.600
2,042.4	40 Zr	L $\alpha_1$	100	2,376.5	45 Rh	Ll	4				
2,050.5	78 Pt	M $\alpha_1$	100	2,394.8	42 Mo	L $\beta_1$	53				
2,122	43 Tc	Ll	5	2,420	43 Tc	L $\alpha_2$	11				
2,122.9	79 Au	M $\alpha_1$	100	2,422.6	83 Bi	M $\alpha_1$	100				
2,124.4	40 Zr	L $\beta_1$	54	2,424	43 Tc	L $\alpha_1$	100				
2,139.1	15 P	K $\beta_1$	3	2,461.8	41 Nb	L $\gamma_1$	2,633.7	47 Ag	10.5	184.8	576.17
2,163.0	41 Nb	L $\alpha_2$	11	2,464.0	16 S	K $\beta_1$	$\beta$	5			
2,165.9	41 Nb	L $\alpha_1$	100	2,503.4	46 Pd	Ll	4				
2,195.3	80 Hg	M $\alpha_1$	100	2,518.3	42 Mo	L $\beta_{2,15}$	5				
2,219.4	40 Zr	L $\beta_{2,15}$	1	2,538	43 Tc	L $\beta_1$	54				
2,252.8	44 Ru	Ll	4	2,554.3	44 Ru	L $\alpha_2$	11				
2,257.4	41 Nb	L $\beta_1$	52	2,558.6	44 Ru	L $\alpha_1$	100				
2,270.6	81 Tl	M $\alpha_1$	100	2,620.8	17 Cl	K $\alpha_2$	50				
2,289.8	42 Mo	L $\alpha_2$	11	2,622.4	17 Cl	K $\alpha_1$	100				
2,293.2	42 Mo	L $\alpha_1$	100	2,623.5	42 Mo	L $\gamma_1$	3				
2,302.7	40 Zr	L $\gamma_1$	2	2,633.7	47 Ag	Ll	4				
2,306.6	16 S	K $\alpha_2$	50	2,674	43 Tc	L $\beta_{2,15}$	7				
2,307.8	16 S	K $\alpha_1$	100	2,683.2	44 Ru	L $\beta_1$	54				
2,345.5	82 Pb	M $\alpha_1$	100	2,692.0	45 Rh	L $\alpha_2$	11				





*Energies and intensities of x-ray emission lines (continued).*

<b>Energy (eV)</b>	<b>Element</b>	<b>Line</b>
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8,045.8	77 Ir	Ll	5
8,047.8	29 Cu	K $\alpha_1$	100
8,087.9	73 Ta	L $\alpha_2$	11
8,101	69 Tm	L $\beta_1$	64
8,102	65 Tb	L $\gamma_1$	11
8,146.1	73 Ta	L $\alpha_1$	100
8,189.0	68 Er	L $\beta_{2,15}$	20
8,264.7	28 Ni	K $\beta_{1,3}$	17
8,268	78 Pt	Ll	5
8,335.2	74 W	L $\alpha_2$	11
8,397.6	74 W	L $\alpha_1$	100
8,401.8	70 Yb	L $\beta_1$	20 65
8 8,418.8	66 Dy	Yb L	

$\beta$

$\alpha$

*Energies and intensities of x-ray emission lines (continued).*

<b>Energy (eV)</b>	<b>Element</b>	<b>Line</b>	<b>Relative intensity</b>								
10,449.5	82 Pb	L $\alpha_2$	11	11,250.5	78 Pt	L $\beta_2$	23	12,598	36 Kr	K $\alpha_2$	52
10,508.0	33 As	K $\alpha_2$	51	11,285.9	74 W	L $\gamma_1$	13	12,613.7	82 Pb	L $\beta_1$	66
10,515.8	72 Hf	L $\gamma_1$	12	11,442.3	79 Au	L $\beta_1$	67	12,622.6	82 Pb	L $\beta_2$	25
10,543.7	33 As	K $\alpha_1$	100	11,584.7	79 Au	L $\beta_2$	23	12,649	36 Kr	K $\alpha_1$	100
10,551.5	82 Pb	L $\alpha_1$	100	11,618.3	92 U	Ll	7	12,652	34 Se	K $\beta_2$	1
10,598.5	76 Os	L $\beta_2$	22	11,685.4	75 Re	L $\gamma_1$	13	12,809.6	90 Th	L $\alpha_2$	11
10,708.3	77 Ir	L $\beta_1$	66	11,720.3	33 As	K $\beta_3$	6	12,942.0	78 Pt	L $\gamma_1$	13
10,730.9	83 Bi	L $\alpha_2$	11	11,726.2	33 As	K $\beta_1$	13	12,968.7	90 Th	L $\alpha_1$	100
10,838.8	83 Bi	L $\alpha_1$	100	11,822.6	80 Hg	L $\beta_1$	67	12,979.9	83 Bi	L $\beta_2$	25
10,895.2	73 Ta	L $\gamma_1$	12	11,864	33 As	K $\beta_2$	1	13,023.5	83 Bi	L $\beta_1$	67
10,920.3	77 Ir	L $\beta_2$	22	11,877.6	35 Br	K $\alpha_2$	52	13,284.5	35 Br	K $\beta_3$	7
10,978.0	32 Ge	K $\beta_3$	6	11,924.1	80 Hg	L $\beta_2$	24	13,291.4	35 Br	K $\beta_1$	14
10,982.1	32 Ge	K $\beta_1$	60	11,924.2	35 Br	K $\alpha_1$	100	13,335.8	37 Rb	K $\alpha_2$	52
11,070.7	78 Pt	L $\beta_1$	67	12,095.3	76 Os	L $\gamma_1$	13	13,381.7	79 Au	L $\gamma_1$	13
11,118.6	90 Th	Ll	6	12,213.3	81 Tl	L $\beta_1$	67	13,395.3	37 Rb	K $\alpha_1$	100
11,181.4	34 Se	K $\alpha_2$	52	12,271.5	81 Tl	L $\beta_2$	25	13,438.8	92 U	L $\alpha_2$	11
11,222.4	34 Se	K $\alpha_1$	100	12,489.6	34 Se	K $\beta_3$	6	13,469.5	35 Br	K $\beta_2$	1
				12,495.9	34 Se	K $\beta_1$	13	13,614.7	92 U	L $\alpha_1$	100
				12,512.6	77 Ir	L $\gamma_1$	13				



14,097.9 38 Sr K $\alpha$

*Energies and intensities of x-ray emission lines (continued).*

<b>Energy (eV)</b>	<b>Element</b>	<b>Line</b>	<b>Relative intensity</b>								
				26,359.1	51 Sb	K $\alpha_1$	100	30,972.8	55 Cs	K $\alpha_1$	100
				26,643.8	48 Cd	K $\beta_2$	4	30,995.7	52 Te	K $\beta_1$	18
22,723.6	45 Rh	K $\beta_1$	16	27,201.7	52 Te	K $\alpha_2$	54	31,700.4	52 Te	K $\beta_2$	5
22,984.1	48 Cd	K $\alpha_2$	53	27,237.7	49 In	K $\beta_3$	9	31,817.1	56 Ba	K $\alpha_2$	54
23,172.8	45 Rh	K $\beta_2$	4	27,275.9	49 In	K $\beta_1$	17	32,193.6	56 Ba	K $\alpha_1$	100
23,173.6	48 Cd	K $\alpha_1$	100	27,472.3	52 Te	K $\alpha_1$	100	32,239.4	53 I	K $\beta_3$	9
23,791.1	46 Pd	K $\beta_3$	8	27,860.8	49 In	K $\beta_2$	5	32,294.7	53 I	K $\beta_1$	18
23,818.7	46 Pd	K $\beta_1$	16	28,317.2	53 I	K $\alpha_2$	54	33,034.1	57 La	K $\alpha_2$	54
24,002.0	49 In	K $\alpha_2$	53	28,444.0	50 Sn	K $\beta_3$	9	33,042	53 I	K $\beta_2$	5
24,209.7	49 In	K $\alpha_1$	100	28,486.0	50 Sn	K $\beta_1$	17	33,441.8	57 La	K $\alpha_1$	100
24,299.1	46 Pd	K $\beta_2$	4	28,612.0	53 I	K $\alpha_1$	100	33,562	54 Xe	K $\beta_3$	9
24,911.5	47 Ag	K $\beta_3$	9	29,109.3	50 Sn	K $\beta_2$	5	33,624	54 Xe	K $\beta_1$	18
24,942.4	47 Ag	K $\beta_1$	16	29,458	54 Xe	K $\alpha_2$	54	34,278.9	58 Ce	K $\alpha_2$	55
25,044.0	50 Sn	K $\alpha_2$	53	29,679.2	51 Sb	K $\beta_3$	9	34,415	54 Xe	K $\beta_2$	5
25,271.3	50 Sn	K $\alpha_1$	100	29,725.6	51 Sb	K $\beta_1$	18	34,719.7	58 Ce	K $\alpha_1$	100
25,456.4	47 Ag	K $\beta_2$	4	29,779	54 Xe	K $\alpha_1$	100	34,919.4	55 Cs	K $\beta_3$	9
26,061.2	48 Cd	K $\beta_3$	9	30,389.5	51 Sb	K $\beta_2$	5	34,986.9	55 Cs	K $\beta_1$	18
26,095.5	48 Cd	K $\beta_1$	17	30,625.1	55 Cs	K $\alpha_2$	54	35,550.2	59 Pr	K $\alpha_2$	55
26,110.8	51 Sb	K $\alpha_2$	54	30,944.3	52 Te	K $\beta_3$	9	35,822	55 Cs	K $\beta_2$	6





74,969.4	82 Pb	K $\alpha_1$	100
75,368	78 Pt	K $\beta_3$	12
75,575	77 Ir	K $\beta_2$	8
75,748	78 Pt	K $\beta_1$	23
77,107.9	83 Bi	K $\alpha_1$	100
77,580	79 Au	K $\beta_3$	12
77,850	78 Pt	K $\beta_2$	8
77,984	79 Au	K $\beta_1$	23
79,822	80 Hg	K $\beta_3$	12
80,150	79 Au	K $\beta_2$	8
80,253	80 Hg	K $\beta_1$	23

82,118	81 Tl	K $\beta_3$	12
82,515	80 Hg	K $\beta_2$	8
82,576	81 Tl	K $\beta_1$	23
84,450	82 Pb	K $\beta_3$	12
84,910	81 Tl	K $\beta_2$	8
84,936	82 Pb	K $\beta_1$	23
86,834	83 Bi	K $\beta_3$	12
87,320	82 Pb	K $\beta_2$	8
87,343	83 Bi	K $\beta_1$	23
89,830	83 Bi	K $\beta_2$	9

89,953	90 Th	K $\alpha_2$	62
93,350	90 Th	K $\alpha_1$	100
94,665	92 U	K $\alpha_2$	62
98,439	92 U	K $\alpha_1$	100
104,831	90 Th	K $\beta_3$	12
105,609	90 Th	K $\beta_1$	24
108,640	90 Th	K $\beta_2$	9
110,406	92 U	K $\beta_3$	13
111,300	92 U	K $\beta_1$	24
114,530	92 U	K $\beta_2$	9