X-Ray Energy Reference









																	H Hydrogen 1
												0.18 B Boron 5	0.28 C Carbon 6	0.39 N Nitrogen 7	0.53 O Oxygen 8	0.68 F Fluorine 9	0.85 Ne Neon 10
1.04 1.07 Na Sodium 11	1.25 1.30 Mg Magnesium 12											1.49 1.55 Al Aluminum 13	1.74 1.83 Si Silicon 14	2.02 2.14 P Phosphorus 15	2.31 2.46 S Sulfur 16	2.62 2.82 Cl Chlorine 17	2.96 3.19 Ar Argon 18
3.31 3.59 K Potassium 19	3.69 4.01 Ca Calcium 20	4.09 4.46 Sc Scandium 21	4.51 4.93 Ti Titanium 22	4.95 5.43 V Vanadium 23	5.41 5.95 Cr Chromium 24	5.90 6.49 Mn Manganese 25	6.40 7.06 Fe Iron 26	6.93 7.65 Co Cobalt 27	7.48 8.26 Ni Nickel 28	8.05 8.90 Cu Copper 29	8.64 9.57 Zn Zinc 30	9.25 10.26 Ga Gallium 31	9.89 10.98 Ge Germanium 32	10.54 11.73 As Arsenic 33	11.22 12.50 Se Selenium 34	11.92 13.29 Br Bromine 35	12.65 14.11 Kr Krypton 36
		0.40 0.40	0.45 0.46	0.51 0.52	0.57 0.58	0.64 0.65	0.70 0.72	0.78 0.79	0.85 0.87	0.93 0.95	1.01 1.03	1.10 1.12	1.19 1.21	1.28 1.32	1.38 1.42	1.48 1.53	1.59 1.64
13.39 14.96 Rb Rubidium 37	14.16 15.83 Sr Strontium 38	14.96 16.74 Y Yttrium 39	15.77 17.67 Zr Zirconium 40	16.61 18.62 Nb Niobium 41	17.48 19.61 Mo Molybdenum 42	18.41 20.59 Tc Technetium 43	19.28 21.66 Ru Ruthenium 44	20.21 22.72 Rh Rhodium 45	21.18 23.82 Pd Palladium 46	22.16 24.94 Ag Silver 47	23.17 26.09 Cd Cadmium 48	24.21 27.27 In Indium 49	25.27 28.48 Sn Tin 50	26.36 29.72 Sb Antimony 51	27.47 30.99 Te Tellurium 52	28.61 32.29 I Iodine 53	29.80 33.64 Xe Xenon 54
1.69 1.75	1.81 1.87	1.92 2.00	2.04 2.12	2.17 2.26	2.29 2.40	2.42 2.54	2.56 2.68	2.70 2.83	2.84 2.99	2.98 3.15	3.13 3.32	3.29 3.49	3.44 3.66	3.61 3.84	3.77 4.03	3.94 4.22	4.11 4.42
30.97 34.98 Cs Cesium 55	32.19 36.38 Ba Barium 56		55.76 63.21 Hf Hafnium 72	57.52 65.21 Ta Tantalum 73	59.31 67.23 W Tungsten 74	61.13 69.30 Re Rhenium 75	62.99 71.40 Os Osmium 76	64.89 73.55 Ir Iridium 77	66.82 75.74 Pt Platinum 78	68.79 77.97 Au Gold 79	70.82 80.26 Hg Mercury 80	72.86 82.56 Tl Thallium 81	74.96 84.92 Pb Lead 82	77.10 87.34 Bi Bismuth 83	79.30 89.81 Po Polonium 84	81.53 92.32 At Astatine 85	83.80 94.88 Rn Radon 86
4.29 4.62	4.47 4.83		7.90 9.02	8.15 9.34	8.40 9.67	8.65 10.01	8.91 10.35	9.19 10.71	9.44 11.07	9.71 11.44	9.99 11.82	10.27 12.21	10.55 12.61	10.84 13.02	11.13 13.44	11.42 13.87	11.72 14.32
86.11 97.47 Fr Francium 87	88.47 100.1 Ra Radium 88	57- 71	33.44 37.80 La Lanthanum 57	34.72 39.26 Ce Cerium 58	36.02 40.75 Pr Praseodymium 59	37.36 42.27 Nd Neodymium 60	38.65 43.95 Pm Promethium 61	40.12 45.40 Sm Samarium 62	41.53 47.03 Eu Europium 63	42.98 48.72 Gd Gadolinium 64	44.47 50.39 Tb Terbium 65	45.99 52.17 Dy Dysprosium 66	47.53 53.93 Ho Holmium 67	49.10 55.69 Er Erbium 68	50.73 57.58 Tm Thulium 69	52.36 59.35 Yb Ytterbium 70	54.06 61.28 Lu Lutetium 71
12.03 14.77	12.34 15.23	89-103	4.65 5.04	4.84 5.26	5.03 5.49	5.23 5.72	5.43 5.96	5.64 6.21	5.85 6.46	6.06 6.71	6.28 6.98	6.50 7.25	6.72 7.53	6.95 7.81	7.18 8.10	7.41 8.40	7.65 8.71
			90.89 102.8 Ac Actinium 89	93.35 105.6 Th Thorium 90	95.86 108.4 Pa Protactinium 91	98.43 111.3 U Uranium 92	101.1 114.2 Np Neptunium 93	103.7 117.2 Pu Plutonium 94	106.5 120.3 Am Americium 95	109.3 123.4 Cm Curium 96	112.1 126.6 Bk Berkelium 97	115.0 129.8 Cf Californium 98	118.0 133.1 Es Einsteinium 99	121.1 136.5 Fm Fermium 100	125.2 141.0 Md Mendelevium 101	127.4 143.5 No Nobelium 102	130.6 147.1 Lr Lawrencium 103
			12.65 15.71	12.97 16.20	13.29 16.70	13.61 17.22	13.95 17.74	14.28 18.28	14.62 18.83	14.96 19.39	15.31 19.97	15.66 20.56	16.02 21.17	16.38 21.79	16.74 22.55	17.11 23.23	17.48 23.93

Ag — Key to Energy Values

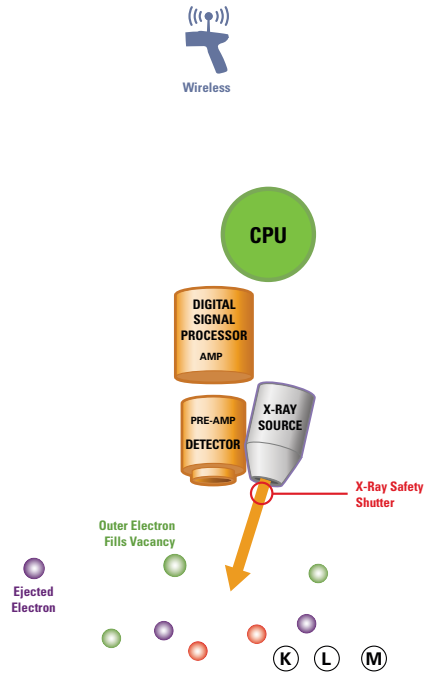
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How XRF Analysis Works



1. X-rays are produced by the analyzer and pointed at a sample surface.
2. The energy causes inner-shell electrons to be ejected.
3. Outer-shell electrons fill the vacancies left by the ejected electrons and fluorescent x-rays are emitted.
4. The fluorescent x-rays enter the detector and send electronic pulses to the preamp.
5. The preamp amplifies the signals and sends them to the Digital Signal Processor (DSP).
6. The DSP collects and digitizes the x-ray events and sends the spectral data to the main CPU for processing.
7. The CPU analyzes the spectral data to produce detailed composition analysis.
8. Composition data and other grade or value identification are displayed and stored in memory for later recall or download to an external PC.

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