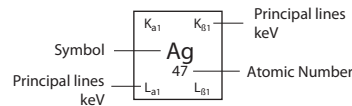




Alloy Analysis:
 Elements detected: Magnesium (Mg, Z=12) through Sulfur (S, Z=16) and Titanium (Ti, Z=22) through Plutonium (Pu, Z=94).



Please see separate Alloy Analysis LOD Specifications.

Detection limits are a function of testing time, sample matrix and presence of interfering elements. Detection limits are estimates based on 1-2 minutes test times and detection confidence of 3σ (99.7% confidence). Interference-free detection limits are intended as guidelines; please contact Olympus Innov-X to discuss your specific application.



PHOTON ENERGIES, IN ELECTRON VOLTS, OF PRINCIPAL K- AND L-SHELL EMISSION LINES

| Element | Symbol | Atomic # | K _{α1} | K _{β1} | L _{α1} | L _{β1} |
|------------|--------|----------|-----------------|-----------------|-----------------|-----------------|
| Actinium | Ac | 89 | 90.88 | 102.85 | 12.65 | 15.71 |
| Aluminum | Al | 13 | 1.49 | 1.56 | 0 | 0 |
| Antimony | Sb | 51 | 26.36 | 29.73 | 3.6 | 3.84 |
| Argon | Ar | 18 | 2.96 | 3.19 | 0 | 0 |
| Arsenic | As | 33 | 10.54 | 11.73 | 1.28 | 1.32 |
| Astatine | At | 85 | 81.52 | 92.3 | 11.43 | 13.88 |
| Barium | Ba | 56 | 32.19 | 36.38 | 4.47 | 4.83 |
| Beryllium | Be | 4 | 0.11 | 0 | 0 | 0 |
| Bismuth | Bi | 83 | 77.11 | 87.34 | 10.84 | 13.02 |
| Boron | B | 5 | 0.18 | 0 | 0 | 0 |
| Bromine | Br | 35 | 11.92 | 13.29 | 1.48 | 1.53 |
| Cadmium | Cd | 48 | 23.17 | 26.1 | 3.13 | 3.32 |
| Calcium | Ca | 20 | 3.69 | 4.01 | 0.34 | 0.34 |
| Carbon | C | 6 | 0.28 | 0 | 0 | 0 |
| Cerium | Ce | 58 | 34.72 | 39.26 | 4.84 | 5.26 |
| Cesium | Cs | 55 | 30.97 | 34.99 | 4.29 | 4.62 |
| Chlorine | Cl | 17 | 2.62 | 2.82 | 0 | 0 |
| Chromium | Cr | 24 | 5.41 | 5.95 | 0.57 | 0.58 |
| Cobalt | Co | 27 | 6.93 | 7.65 | 0.78 | 0.79 |
| Copper | Cu | 29 | 8.05 | 8.91 | 0.93 | 0.95 |
| Dysprosium | Dy | 66 | 46 | 52.12 | 6.5 | 7.25 |
| Erbium | Er | 68 | 49.13 | 55.68 | 6.95 | 7.81 |
| Europium | Eu | 63 | 41.54 | 47.04 | 5.85 | 6.46 |
| Fluorine | F | 9 | 0.68 | 0 | 0 | 0 |
| Francium | Fr | 87 | 86.1 | 97.47 | 12.03 | 14.77 |
| Gadolinium | Gd | 64 | 43 | 48.7 | 6.06 | 6.71 |
| Gallium | Ga | 31 | 9.25 | 10.26 | 1.1 | 1.12 |
| Germanium | Ge | 32 | 9.89 | 10.98 | 1.19 | 1.22 |
| Gold | Au | 79 | 68.8 | 77.98 | 9.71 | 11.44 |
| Hafnium | Hf | 72 | 55.79 | 63.23 | 7.9 | 9.02 |
| Holmium | Ho | 67 | 47.55 | 53.88 | 6.72 | 7.53 |
| Indium | In | 49 | 24.21 | 27.28 | 3.29 | 3.49 |
| Iodine | I | 53 | 28.61 | 32.29 | 3.94 | 4.22 |
| Iridium | Ir | 77 | 64.9 | 73.56 | 9.18 | 10.71 |
| Iron | Fe | 26 | 6.4 | 7.06 | 0.71 | 0.72 |
| Krypton | Kr | 36 | 12.65 | 14.11 | 1.59 | 1.64 |
| Lanthanum | La | 57 | 33.44 | 37.8 | 4.65 | 5.04 |
| Lead | Pb | 82 | 74.97 | 84.94 | 10.55 | 12.61 |
| Lithium | Li | 3 | 0.05 | 0 | 0 | 0 |
| Lutetium | Lu | 71 | 54.07 | 61.28 | 7.66 | 8.71 |
| Magnesium | Mg | 12 | 1.25 | 1.3 | 0 | 0 |
| Manganese | Mn | 25 | 5.9 | 6.49 | 0.64 | 0.65 |
| Mercury | Hg | 80 | 70.82 | 80.25 | 9.99 | 11.82 |
| Molybdenum | Mo | 42 | 17.48 | 19.61 | 2.29 | 2.39 |
| Neodymium | Nd | 60 | 37.36 | 42.27 | 5.23 | 5.72 |

| Element | Symbol | Atomic # | K _{α1} | K _{β1} | L _{α1} | L _{β1} |
|--------------|--------|----------|-----------------|-----------------|-----------------|-----------------|
| Neon | Ne | 10 | 0.85 | 0 | 0 | 0 |
| Nickel | Ni | 28 | 7.48 | 8.26 | 0.85 | 0.87 |
| Niobium | Nb | 41 | 16.62 | 18.62 | 2.17 | 2.26 |
| Nitrogen | N | 7 | 0.39 | 0 | 0 | 0 |
| Osmium | Os | 76 | 63 | 71.41 | 8.91 | 10.36 |
| Oxygen | O | 8 | 0.52 | 0 | 0 | 0 |
| Palladium | Pd | 46 | 21.18 | 23.82 | 2.84 | 2.99 |
| Phosphorus | P | 15 | 2.01 | 2.14 | 0 | 0 |
| Platinum | Pt | 78 | 66.83 | 75.75 | 9.44 | 11.07 |
| Polonium | Po | 84 | 79.29 | 89.8 | 11.13 | 13.45 |
| Potassium | K | 19 | 3.31 | 3.59 | 0 | 0 |
| Praseodymium | Pr | 59 | 36.03 | 40.75 | 5.03 | 5.49 |
| Promethium | Pm | 61 | 38.72 | 43.83 | 5.43 | 5.96 |
| Protactinium | Pa | 91 | 95.87 | 108.43 | 13.29 | 16.7 |
| Radium | Ra | 88 | 88.47 | 100.13 | 12.34 | 15.24 |
| Radon | Rn | 86 | 83.78 | 94.87 | 11.73 | 14.32 |
| Rhenium | Re | 75 | 61.14 | 69.31 | 8.65 | 10.01 |
| Rhodium | Rh | 45 | 20.22 | 22.72 | 2.7 | 2.83 |
| Rubidium | Rb | 37 | 13.4 | 14.96 | 1.69 | 1.75 |
| Ruthenium | Ru | 44 | 19.28 | 21.66 | 2.56 | 2.68 |
| Samarium | Sm | 62 | 40.12 | 45.41 | 5.64 | 6.21 |
| Scandium | Sc | 21 | 4.09 | 4.46 | 0.4 | 0.4 |
| Selenium | Se | 34 | 11.22 | 12.5 | 1.38 | 1.42 |
| Silicon | Si | 14 | 1.74 | 1.84 | 0 | 0 |
| Silver | Ag | 47 | 22.16 | 24.94 | 2.98 | 3.15 |
| Sodium | Na | 11 | 1.04 | 1.07 | 0 | 0 |
| Strontium | Sr | 38 | 14.17 | 15.84 | 1.81 | 1.87 |
| Sulfur | S | 16 | 2.31 | 2.46 | 0 | 0 |
| Tantalum | Ta | 73 | 57.53 | 65.22 | 8.15 | 9.34 |
| Technetium | Tc | 43 | 18.37 | 20.62 | 2.42 | 2.54 |
| Tellurium | Te | 52 | 27.47 | 31 | 3.77 | 4.03 |
| Terbium | Tb | 65 | 44.48 | 50.38 | 6.27 | 6.98 |
| Thallium | Tl | 81 | 72.87 | 82.58 | 10.27 | 12.21 |
| Thorium | Th | 90 | 93.35 | 105.61 | 12.97 | 16.2 |
| Thulium | Tm | 69 | 50.74 | 57.52 | 7.18 | 8.1 |
| Tin | Sn | 50 | 25.27 | 28.49 | 3.44 | 3.66 |
| Titanium | Ti | 22 | 4.51 | 4.93 | 0.45 | 0.46 |
| Tungsten | W | 74 | 59.32 | 67.24 | 8.4 | 9.67 |
| Uranium | U | 92 | 98.44 | 111.3 | 13.61 | 17.22 |
| Vanadium | V | 23 | 4.95 | 5.43 | 0.51 | 0.52 |
| Xenon | Xe | 54 | 29.78 | 33.62 | 4.11 | 4.42 |
| Ytterbium | Yb | 70 | 52.39 | 59.37 | 7.42 | 8.4 |
| Yttrium | Y | 39 | 14.96 | 16.74 | 1.92 | 2 |
| Zinc | Zn | 30 | 8.64 | 9.57 | 1.01 | 1.03 |
| Zirconium | Zr | 40 | 15.78 | 17.67 | 2.04 | 2.12 |