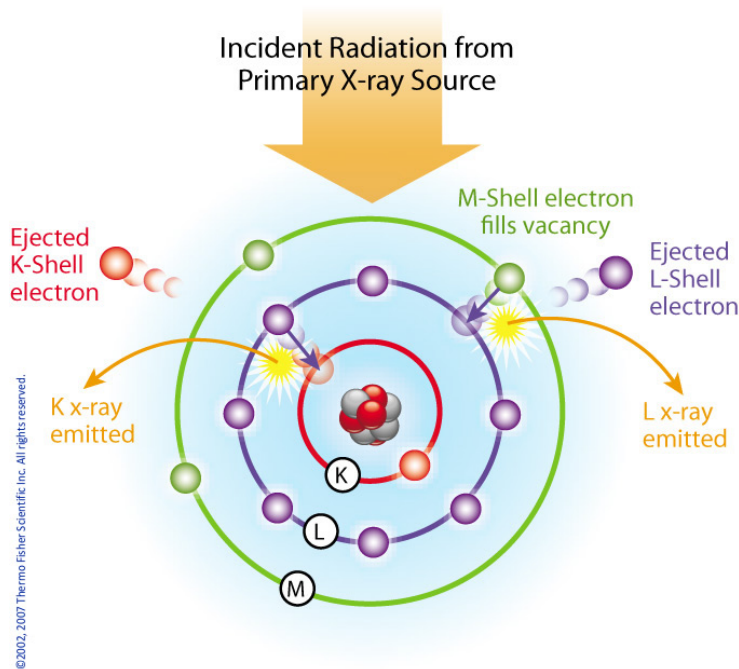


Elemental Analysis - A Unique Set of Fingerprints

How does XRF work? Each of the elements present in a sample produces a unique set of characteristic x-rays that is a "fingerprint" for that specific element. XRF analyzers determine the chemistry of a sample by measuring the spectrum of the characteristic x-ray emitted by the different elements in the sample when it is illuminated by x-rays. These x-rays are emitted either from a miniaturized x-ray tube, or from a small, sealed capsule of radioactive material.

1. A fluorescent x-ray is created when an x-ray of sufficient energy strikes an atom in the sample, dislodging an electron from one of the atom's inner orbital shells.
2. The atom regains stability, filling the vacancy left in the inner orbital shell with an electron from one of the atom's higher energy orbital shells.
3. The electron drops to the lower energy state by releasing a fluorescent x-ray, and the energy of this x-ray is equal to the specific difference in energy between two quantum states of the electron.



When a sample is measured using XRF, each element present in the sample emits its own unique fluorescent x-ray energy spectrum. By simultaneously measuring the fluorescent x-rays emitted by the different elements in the sample, the XRF analyzers can rapidly determine those elements present in the sample and their relative concentrations - in other words, the elemental chemistry of the sample. For samples with specifically defined chemical composition, such as common grades of metal alloys, these XRF instruments also identify most sample types by name, typically in seconds.