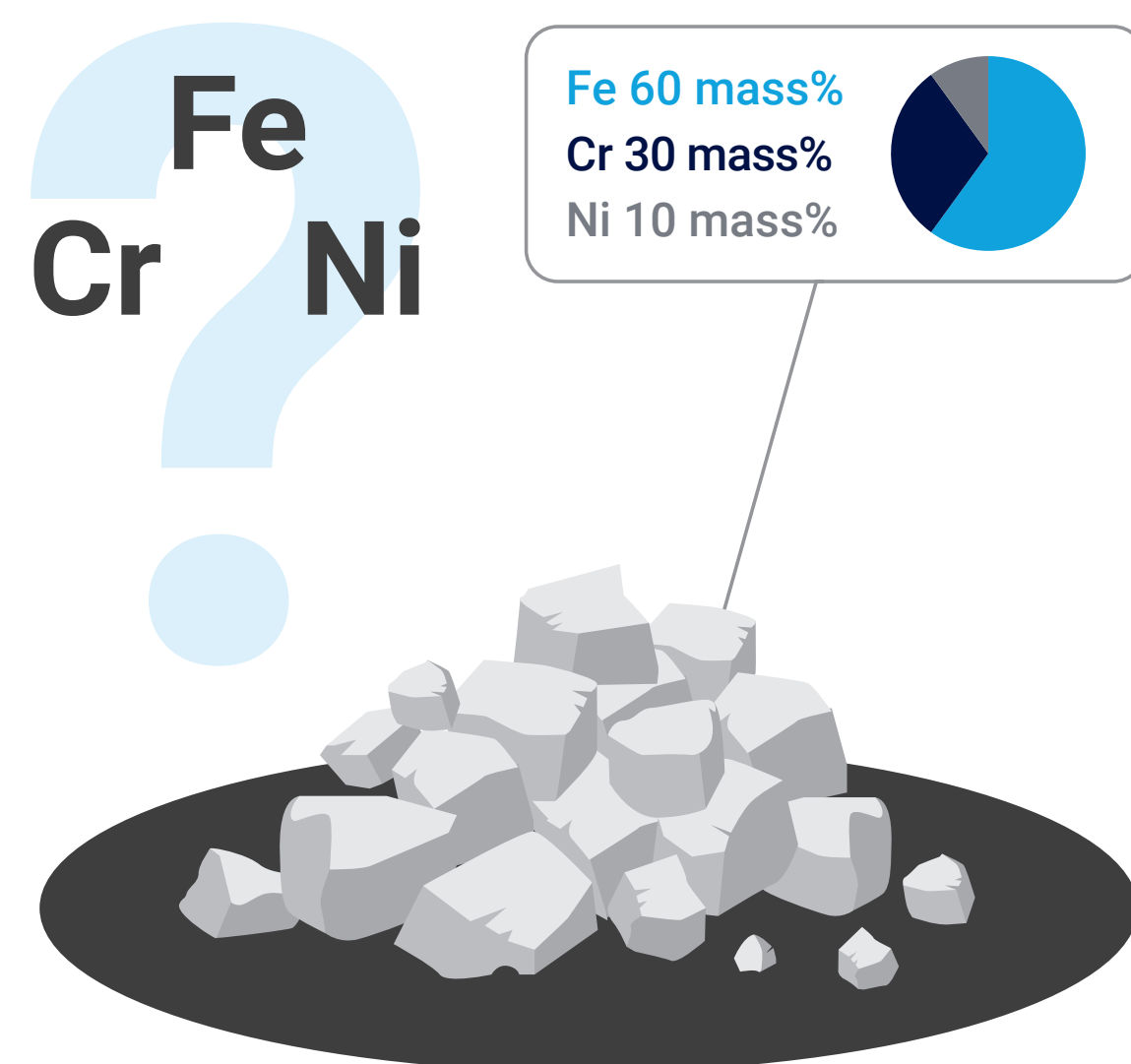


What can XRF tell us?



XRF can provide both qualitative and quantitative analyses of the elements in a sample. In other words, what is present in a sample, and in what relative proportions.

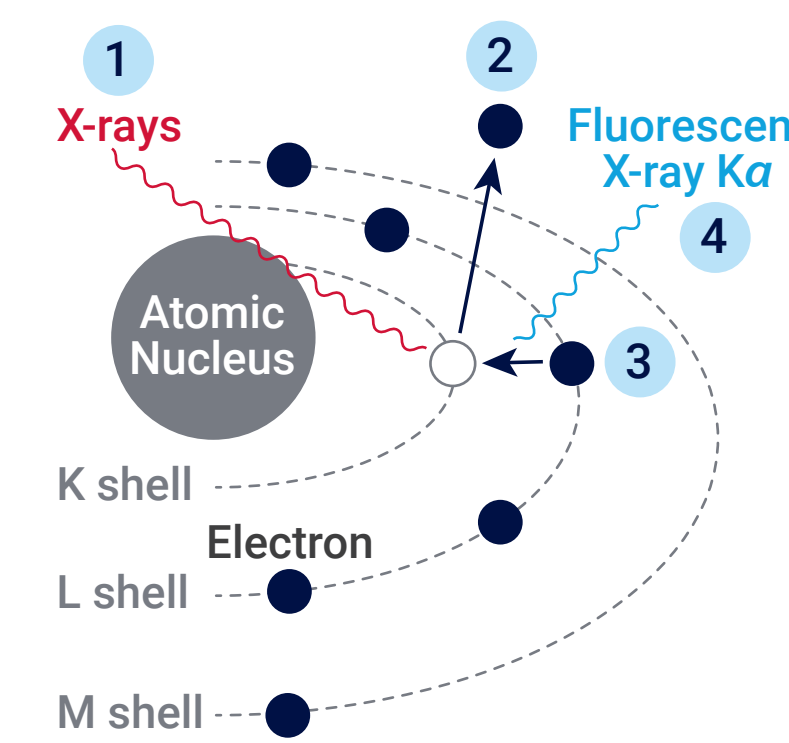
What are the benefits of XRF?



Capable of measuring solids, powders, and liquids nondestructively.

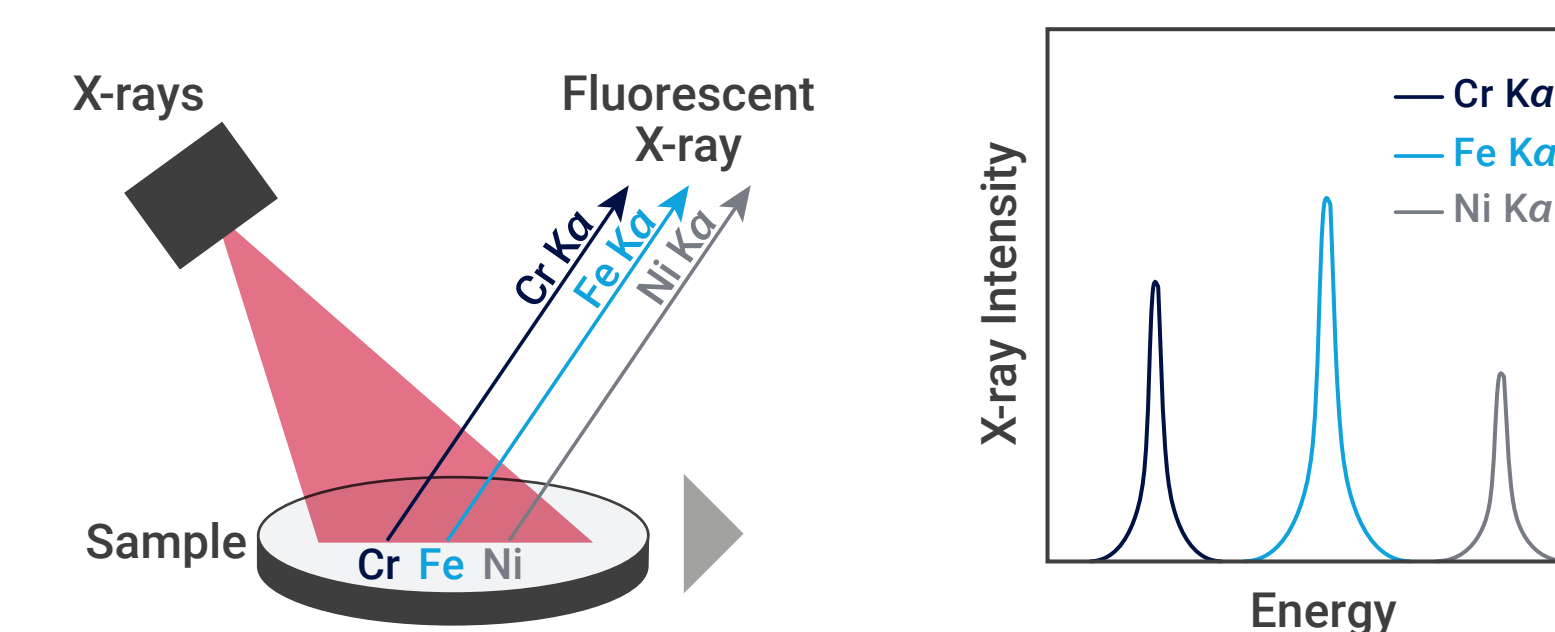
How does XRF work?

- 1 When a sample is irradiated with X-rays, the atoms in the sample absorb energy.
- 2 When a certain amount of energy is absorbed, an electron in an inner shell is ejected, leaving a hole, making the atom unstable (excited state).
- 3 To stabilize the state, the hole in the inner shell is replenished with electrons from the outer shell.
- 4 Since the electrons in the outer shell have high energy, they release the energy as fluorescent X-rays when they fall to the inner shell.



How does XRF do qualitative and quantitative analysis?

Since the energy of fluorescent X-rays is specific to each element, the elements in a sample can be identified by measuring their energies.



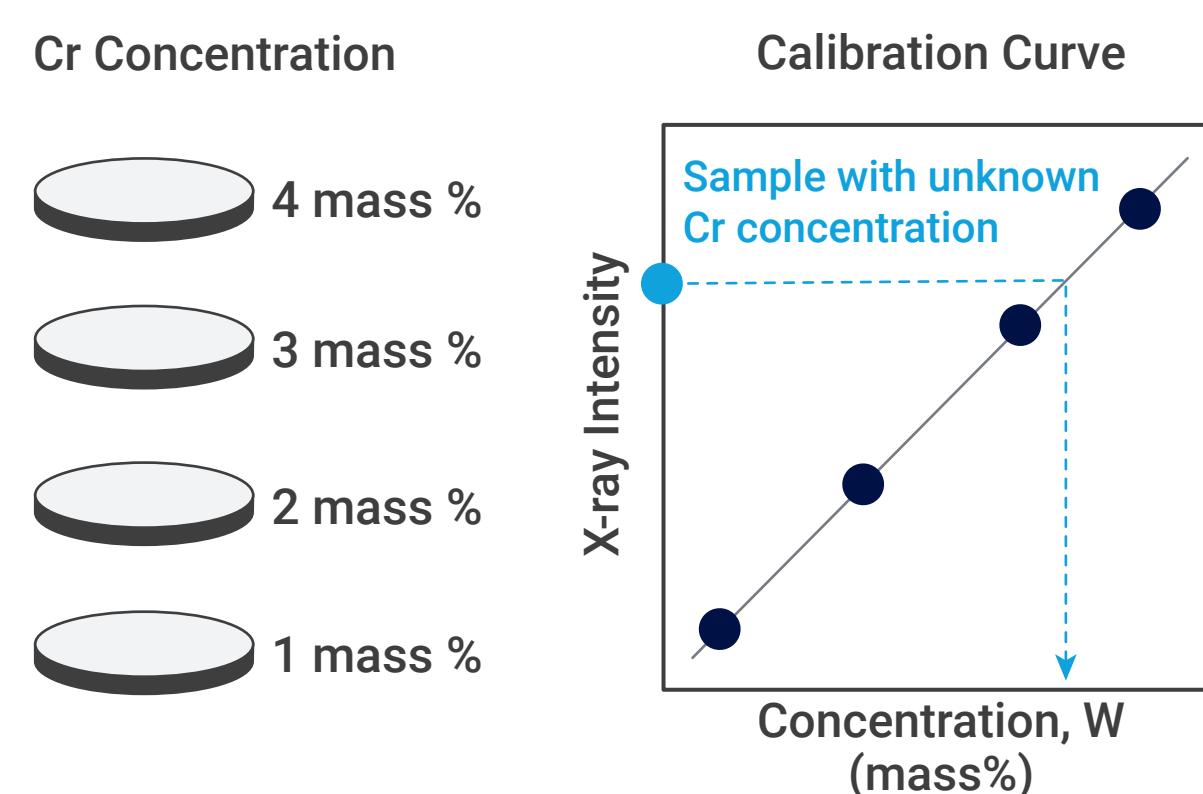
Qualitative Analysis

The elements in a sample can be identified from the energy or wavelength of the peak positions.

Quantitative Analysis

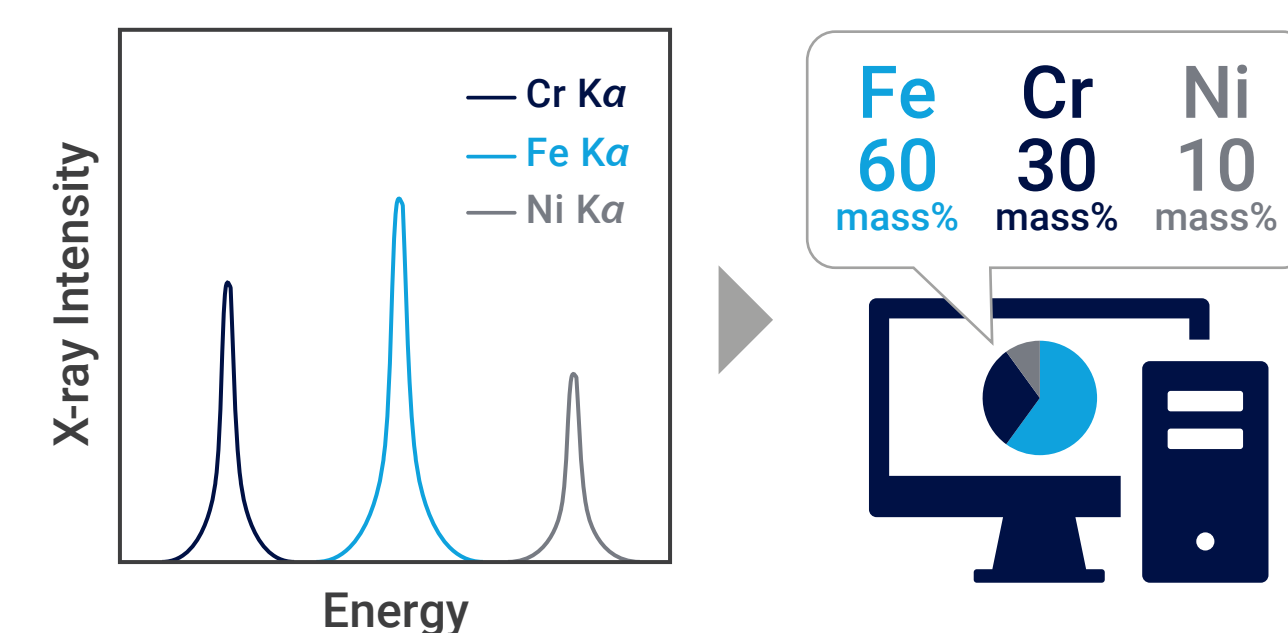
The elemental composition can be identified from the intensity of the signal at the peaks.

Quantitative Methods (1) Calibration curve method



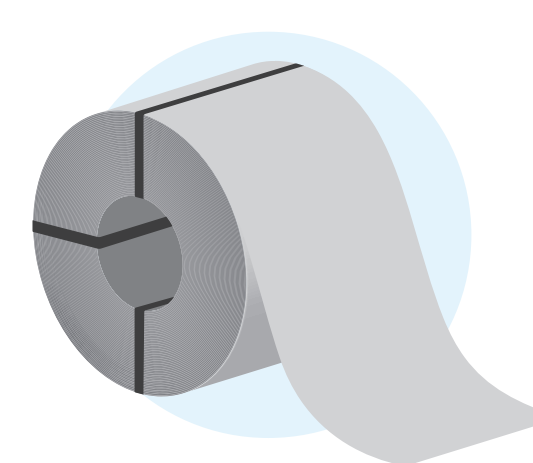
A calibration curve is created by measuring a series of samples with known concentrations in the same matrix as the sample being analyzed. The curve is then used to quantify samples with unknown concentrations, offering highly accurate and precise results.

Quantitative Methods (2) Fundamental Parameter (FP) method



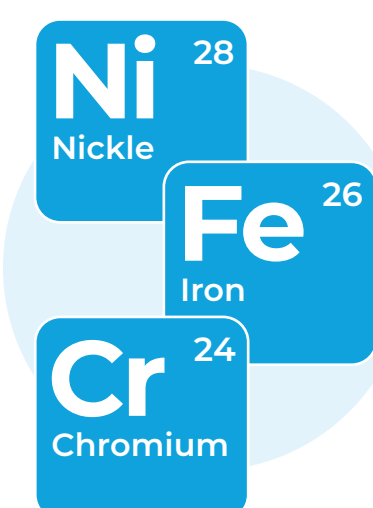
The FP method in XRF analysis is used to calculate element concentrations by modeling X-ray interactions using fundamental parameters like absorption coefficients and instrument parameters. This method does not require calibration standards and is convenient for diverse or unknown samples.

Where is XRF used?



Metal / Alloy Industry

Example: Perform quality control of metal composition and coating weight. Conduct incoming inspection of metals to be recycled.



Natural Resources

Example: Analyze composition and ensure optimum quality control from mining extraction through processing and use of raw materials in manufacturing, electronics, fuels, and energy production.



Battery Industry

Example: Conduct quality control of cathode and anode compositions and analyze valuable metals in recycled battery materials.



Environmental Samples

Example: Analyze minerals and harmful elements in contaminated soils, rivers and atmospheric dust.

Rigaku's XRF Instruments



ZSX Primus IV



Supermini200



NEX CG II



NEX DE



Learn more at
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