

Practical teaching of elemental and structural analysis of materials

Teaching and practical training of elemental and structural analysis of materials is part of many curriculums in colleges and universities. The theoretical part is usually accompanied by hands-on training on the analytical instruments with some standard samples for data collection followed by exposure to various data processing programs. One of the challenges for the faculty is to provide a robust and representative instrument to run the samples under real conditions and obtain quality data for interpretation and knowledge. The advanced and expensive instruments are usually reserved for research scientists in the lab, while the students need to have quick access and fast turnaround time on simpler instruments that are flexible and robust enough.



The recent generation of bench-top instruments which integrate most of the functionalities of high-end instruments are ideally suited for such practical laboratory training needs. X-ray fluorescence (XRF) is one of the fundamental and widely applicable techniques for the elemental analysis of various types of materials. Bench-top or small footprint XRF instruments provide a very good platform for the analytical chemistry labs engaged in training. X-ray diffraction (XRD), which is more commonly taught than XRF, is an essential part of any laboratory involved in structural analysis of materials.

A bench-top XRD with flexibility and convenience to handle a variety of samples is best suited for practical training sessions on crystallography, mineralogy or phase analysis of polycrystalline materials. Despite their simplicity to install and operate such instruments, their software and data processing capabilities are not compromised when compared to high-end instruments. Thus the students and early-stage research scientists can practice the analytical techniques with state-of-the-art instrumentation and software features.

Top sample types for practical teaching of XRF and XRD

- Bulk inorganic samples such as cement, metal, mineral, glass or soil
- A typical organic sample such as a polymer or milk powder or a pharmaceutical tablet
- A thin film, coating on a substrate or a filter
- A liquid sample such as oil or water

Thermo Scientific XRF and XRD solutions for practical training of analytical techniques in colleges and academic institutes



Thermo Scientific™ ARL™ EQUINOX 100 X-Ray Diffractometer for structural analysis

- Easy-to-use simultaneous full pattern XRD based on unique detector technology without motorization
- Can perform XRD experiments on standard powders, thin films or small grains, with capillary stage or in controlled environment
- Can be exploited to provide practical training on various aspects of XRD: polymorphism, crystallinity, quantitative phase analysis, reactivity and stability of materials, basic crystallography
- Lowest cost of ownership with no peripheral dependence and maintenance

Thermo Scientific™ ARL™ QUANT'X Benchtop EDXRF Spectrometer for elemental analysis

- Transportable and easy-to-use bench-top instrument for rapid screening and finger-printing
- Flexible sample handling for bulk materials and small samples of solids, liquids, granules or films
- Can perform analysis under air, vacuum or helium depending on the sample type
- Provides state-of-the-art EDXRF platform for teaching analysis of various materials
- Qualitative, quantitative and “standard-less” elemental analysis for practical hands-on training
- Also serves as front-end analysis tool before selecting other spectroscopy techniques for more details



Thermo Scientific™ ARL™ OPTIM'X Robust WDXRF Spectrometer for elemental analysis

- Convenient platform with smart goniometer to teach WDXRF technique and related parameters
- Ideally suited to explore and gain full understanding of X-ray spectrometry and its capabilities
- Provides high quality spectral data for further processing with quantitative analysis tools
- Can handle solids, liquids, loose powders or coatings under vacuum or helium
- Economic solution for teaching institutes and early stage research work



Find out more on X-ray solutions at thermofisher.com/xray and our broader portfolio at thermofisher.com/spectroscopy

ThermoFisher
S C I E N T I F I C