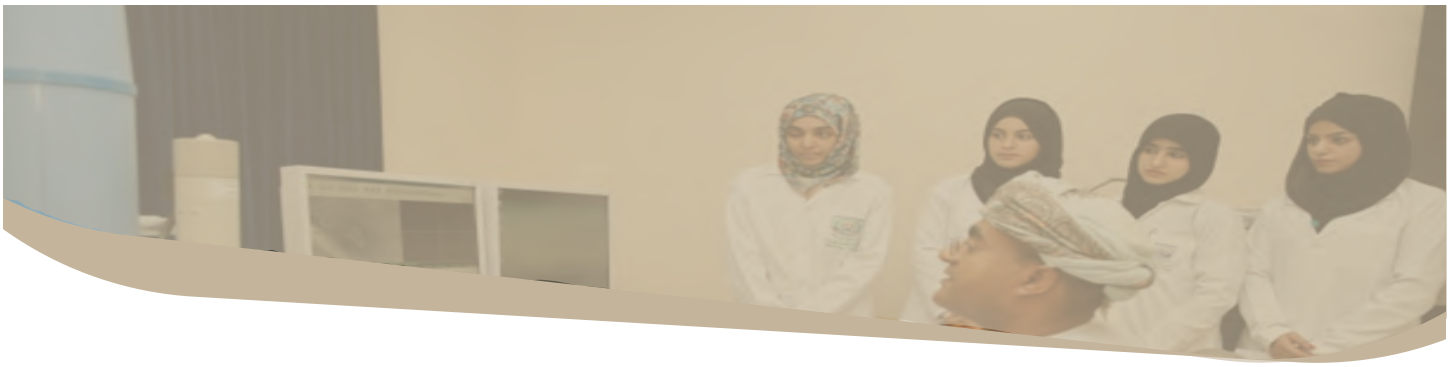
Instruments in collaboration with Daris Center



Transmission Electron Microscope (TEM)

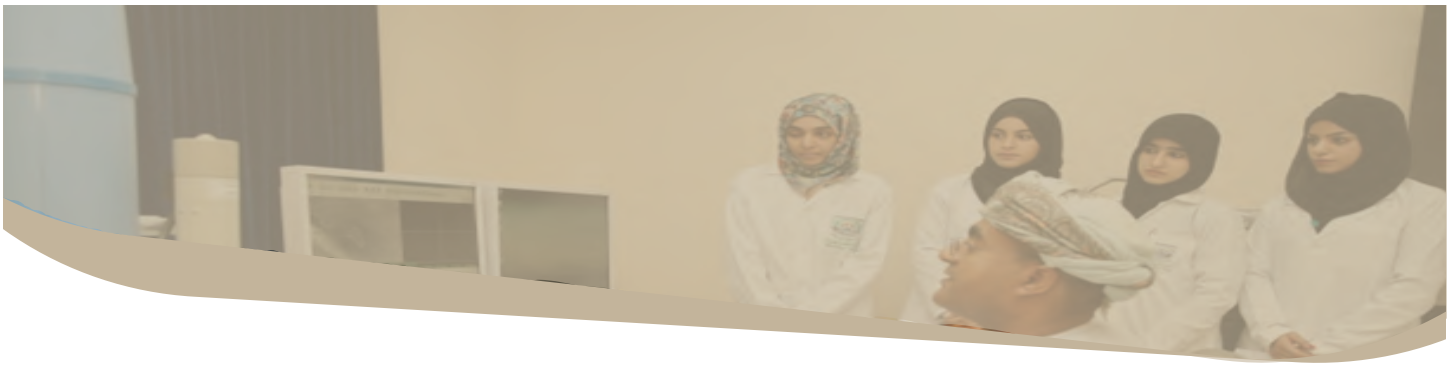
JEOL JEM-1400 TEM with 3D Tomography System

The JEOL JEM-1400 TEM is an ultra-high magnification instrument offering state-of-the-art high contrast imaging up to x1,200,000 magnification with a high resolution of up to 0.2 nm for observing the internal structure (ultrastructure) of a specimen in micrometer (µm) and nanometer (nm) ranges. The system has the capability of exporting data to a dedicated tomography system for 3D structural elucidation. The specimen chamber has the capacity to load five samples at a time, 1mm3 biological samples are sliced into ultrathin sections from 60-90nm thickness using an ultramicrotome and then loaded onto Formvar carbon coated grids.

Scanning Electron Microscope (SEM)

JEOL JSM-6510LA SEM with SED, BSD, and EDS detectors

The JEOL JSM-6510LA SEM is capable of high magnification for observing the surface structure (topography) of a specimen in micrometer (µm) and nanometer (nm) ranges. The magnification is variable from x10 to x300,000 with a resolution of up to 3 nm. Unlike conventional light microscopes the SEM uses a beam of electrons to scan the sample; the reflected electrons are then detected using different types of detectors to create a 3D image in grey scale.

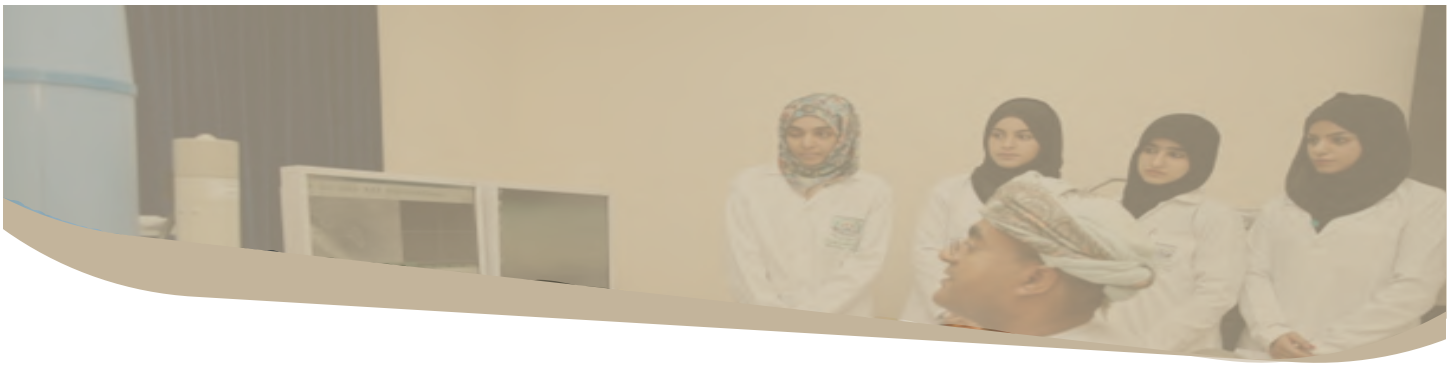


High Performance Liquid Chromatography- Ultra Violet detection (HPLC-UV)

Liquid chromatography UV detection is an analytical technique where by certain non-volatile group of compounds can be analyzed using the Ultra Violet (UV) detection to identify and quantify compounds of interest. This system is one of the most common instrumentation in the majority of the analytical laboratories around the world. This is mainly due to the fact that the instrumentation is relatively cheap to acquire and easy to use with minimal training for the staff. As with LC-MS this instrumentation has a wide range of uses and is applicable to compounds such as pesticides, pharmaceutical products, drugs of abuse and many other categories.

Liquid Chromatography- Mass Spectrometry (LC-MS)

Liquid chromatography–Mass spectrometry (LC-MS, or alternatively HPLC-MS) is an analytical chemistry technique that combines separation capabilities of liquid chromatography (or HPLC) with the mass analysis capabilities of mass spectrometry (MS). LC-MS is a powerful technique that has very high sensitivity and selectivity and as such is useful in many applications. Its application is wide ranging from detection of pesticides in water, blood, soil to analysis and identification of medicine and chemicals used in pharmaceutical industry, Forensic science, Hospitals.

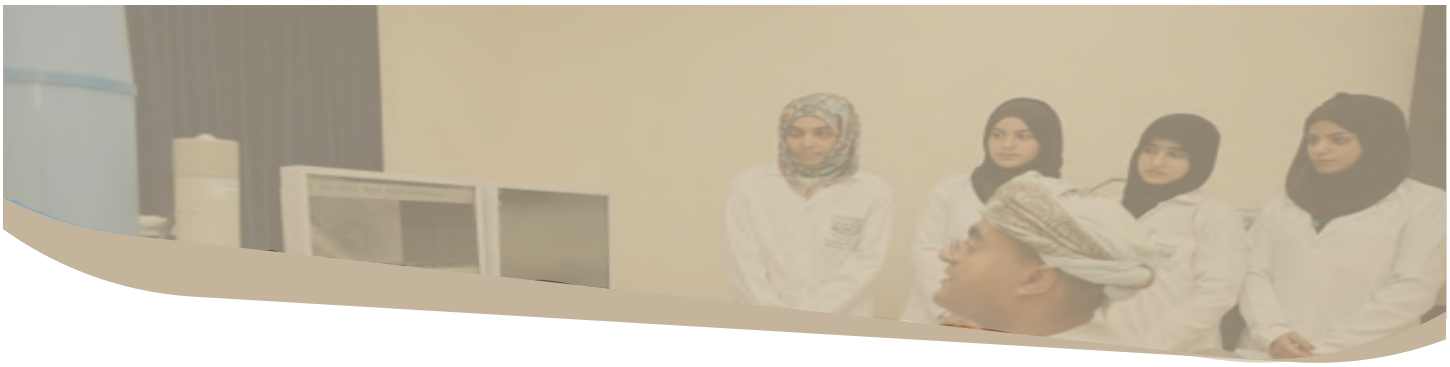


Gas Chromatography – Flame Ionization Detector (GC-FID)

Gas chromatography with Flame Ionization Detector (GC-FID) is a common type of chromatography used in analytical chemistry for the separation and analysis of multi-residue samples that can be vaporized without decomposition. The sample migrates through the column with a flow of inert or unreactive gas, which is called the carrier gas. The mechanism of separation is influenced by many factors, for example, the components, which have low boiling points, will come out of the column earlier and will be detected faster than those that have high boiling points. Linearity and detection ranges: FIDs can measure organic substance concentration at very low and very high levels, having a linear response of 10^6.

Gas Chromatography – Mass Spectrometry (GC – MS)

Gas chromatography–mass spectrometry (GC-MS) is an analytical method that combines the features of gas-liquid chromatography and mass spectrometry to identify different substances within a test sample. GC-MS has been widely heralded as a "gold standard" for forensic substance identification because it is used to perform a specific test. A specific test positively identifies the actual presence of a particular substance in a given sample. A non-specific test merely indicates that a substance falls into a category of substances. Although a non-specific test could statistically suggest the identity of the substance, this could lead to false positive identification.



Atomic Absorption Spectroscopy (AAS)

Atomic absorption spectroscopy (AAS) is a spectroanalytical procedure for the quantitative determination of chemical elements using the absorption of optical radiation (light) by free atoms in the gaseous state. In analytical chemistry the technique is used for determining the concentration of a particular element (the analyte) in a sample to be analyzed. AAS can be used to determine over 70 different elements in solution or directly in solid samples used in pharmacology, biophysics and toxicology research.

Inductively Coupled Plasma - Mass Spectrometry (ICP-MS)

Inductively coupled plasma mass spectrometry (ICP-MS) is a type of mass spectrometry which is capable of detecting metals and several non-metals at concentrations as low as one part in per trillion. This is achieved by ionizing the sample with inductively coupled plasma and then using a mass spectrometer to separate and quantify those ions. Compared to other atomic absorption techniques for example, Atomic Absorption Spectroscopy, ICP-MS has greater speed, precision, and sensitivity. However, analysis by ICP-MS is also more susceptible to trace contaminants from glassware and reagents. One of the largest volume uses for ICP-MS is in the medical and forensic field, specifically, toxicology. A physician may order a metal assay for a number of reasons, such as suspicion of heavy metal poisoning, metabolic concerns, and even hepatological (liver related) issues.