

Scientific Equipment Center

Nuclear Magnetic Resonance

Bar Ilan's nuclear magnetic resonance (NMR) unit is one of the largest in Israel and includes 6 Bruker spectrometer devices (frequencies of 200-700MHz for protons), with one of the instruments dedicated for solids, and the other with a cryo probe for work with proteins and samples at low concentrations. All devices are suitable for 2D experiments and are suitable for nuclides such as ^{13}C , ^{15}N , ^{31}P , ^{25}Mg , ^{27}Al etc.

Mass-Spectrometry

The unit provides mass spectra (MS) analysis for solutions, gases and solids. This unit is equipped with GC-MS, HPLC-MS, MALDI and TGA-MS. A variety of quantitative and qualitative analyses (such as HRMS and MS/MS) are provided for both synthetic and natural substances. Professional consultation and interpretation will be given on demand.

SQ 6120 (ESI/APCI), by Agilent
Q-TOF 6545 (High Resolution) LC-MS (ESI/APCI/ASAP), by Agilent
Autoflex III smartbeam MALDI TOF/TOF, by Bruker
TGA-GC-MS (EI/CI) Clarus 680/Clarus SQ 8C, by Perkin Elmer

Elemental Analysis

The center for Chemical Services is equipped with a Thermo CHNS-O elemental analysis device, model EA 1110, capable of detection of the elements C,H,N,S and O.

Inductively-Coupled Plasma (ICP)

Different elements, including halogens can be detected using the ICP technique, with a SPECTRO ARCOS ICP-OES Multi view device.

BET

Surface area measurements and adsorption isotherms can be performed for solids and powders using a Quantachrome NOVA 3200E device.

Optical Spectroscopy

In the unit for Chemical Analysis, different optical measurements can be performed using diverse techniques,

such as:

Micro Raman spectrometry by JOBIN-YVON
FT-IR by Thermo Scientific
UV-Vis-NIR
Circular Dichroism (CD) spectroscopy- Chirascan
ByApplied photophysics

X-Ray Diffraction (XRD)

Analysis of the structure and composition of crystalline and amorphous materials using X-ray diffraction measurements are performed at our center using a Bruker XRD device, model D8 Advance (powder analysis).

X-Ray Photoelectron Spectroscopy (XPS)

The XPS method allows study of the chemical composition of the surface of materials. Information obtained by this method includes the identification of different elements (except hydrogen) and relative quantity. The Center employs a Kratos Analytical XPS instrument, model AXIS-HS.

Electron Paramagnetic Resonance (EPR)

The center for EPR (or ESR) owns modern equipment that provides the necessary resources for contemporary research in organo-metallic chemistry, organic radicals, radicals in biology research, antioxidants, electrochemistry, radicals in nano-chemistry and protein research. The center possesses an advanced Bruker, ElexSys 500 instrument (4° - 300° K) and an EPR spectrometer – the Bruker EMX 100d.

Molecular modeling and computer-driven materials design

Using molecular modeling computer software has a proven potential for streamlining and optimizing development processes such as pharmaceuticals and nanomaterials. The Department of Chemistry owns an advanced computational platform, both on the hardware and software level, enabling a wide variety of structural and energetic calculations (quantum computations, minimization of energy, conformational searches, molecular dynamics, anchoring, statistical modeling and more) on systems ranging from the atomic level to the crystal lattice cell unit. The calculations are carried out by several research groups with many years of experience.