

## Sophisticated Instrumentation Centre for Applied Research & Testing, Vallabh Vidyanagar

Sr. No.	Instrument	Make/ Model	Major Specifications/ Accessories available	Type of measurement/analysis available
1.	Scanning Electron Microscope	Philips XL30 ESEM	Environmental SEM, HV and LV modes of operation; Magnification: upto 4,50,000x; GSED detector; EDAX detector; Carbon coating unit	Surface topographic/morphological studies of microstructures on bulk specimens; Study of hydrated samples, non-conducting samples, biological samples in uncoated form through ESEM mode; Detection of Boron onwards all elements.
2.	Transmission Electron Microscope	Philips Tecnai 20	Resolution : upto 2 <sup>0</sup> Å; Acc. voltage: 200 kV; Magnification: upto 7,50,000x Ultramicrotome	Morphology, Crystal structure and particle size measurement etc. Study of ultrastructures of biological/non-biological samples. Liposomes, virus and bacteria study also carried out.
3.	XRD Diffractometer (powder)	Philips Xpert MPD	Range (2θ): 2 <sup>0</sup> to 135 <sup>0</sup> ; X-ray tube: Cu; JCPDS database;	2θ vs intensity plots/X-ray diffractograms; search match facility with JCPDS data for qualitative analysis.
4.	Laser Flash Thermal Conductivity Meter	Netsch, MICRO Flash 300	Range: RT to 300 °C; Diffusivity range: 0.01-10 Cm <sup>-1</sup> /s; In plane or through plane measurement	Thermal diffusivity, conductivity, specific heat measurement of materials.
5.	X-ray Fluorescence Spectrometer	Under procurement		
6.	ICP-Atomic Emission Spectrometer	Perkin Elmer Optima 3300 RL	Range: 187-725 nm; Detection limit: up to ppb level; SCD detector for simultaneous detection of 60 elements;	Trace/ultra-trace element analysis of almost all elements; Simultaneous detection of multiple elements.
7.	Thermal Analyzer (DSC, TGA)	Perkin Elmer Pyris1 DSC, Pyris1 TGA,	Temp. range: TGA: RT to 1000 °C DSC: -50 to 550 °C	All types of thermal analysis studies/testing; Thermodynamics, thermal stability, degradation kinetics and curing kinetics etc.
8.	Laser Particle Size Analyzer	Symantec Helos BF	Range: 0.1 to 875 microns; 32 element array detector; Accessories for dry powders, pastes, liquids and small sample quantities	Particle size distributions curve; density distributions etc.
9.	Mercury Porosimeter	Thermoquest Pascal 440 & 140	Range: 400 Kpa to 400 Mpa	Analysis including pore size/volume distribution, bulk density and specific surface for porous solids.

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10.	FT-NMR Spectrometer	Bruker AVANCE -III	400 MHz machine with 5 mm probe: capable of liquid and solid sample for proton, carbon, fluorine, phosphorus and other nuclei. Solid State NMR with 4mm rotor for multi-nuclei analysis. Temperature range from -80 <sup>0</sup> C to +100 <sup>0</sup> C	Structure identification of organic, inorganic and polymer materials. 1D and 2D NMR Spectra of all active nuclei, DEPT, APT, COSY, COSY with and without gradient, TOCSY, NOESY, HMQC, HMBC.
11.	LC-MS/MS	Thermo Scientific LCQ Fleet, TSQ Quantum Access	ESI and APCI source Mass range: LCQ Fleet: 50-2000 Daltons, TSQ: 30-3000 Daltons. Software's Bioworks: Protein and Peptides Molecule weight Studies. Met works: Metabolites studies. LCQ Fleet: Mass fragmentation of compounds up to n <sup>10</sup> .	Separation, Identification and Molecular wt. determination of amino acids, protein, peptides, residual pesticides and non volatile compounds etc. Impurity profile studies of drugs.
12.	GC-Mass Spectrometer	Perkin Elmer Turbomass	Mass range: upto 650 amu; Programmable pneumatic control for carrier gas flow regulation; NIST Mass spectra library	Ionization modes: EI, CI modes of operation; Separation/identification of organic/ organometallic compounds, pesticides, volatile oils etc.
13.	Gas Chromatograph	Perkin Elmer Autosystem XL	Temp. range: up to 450 <sup>0</sup> C; Thermal conductivity and Flame ionization detectors; BP1, BP5, BP225 capillary columns; Gas sampling valve accessory; Packed/ capillary column injector	Separation of closely related chemical species; qualitative/quantitative analysis; residual solvent present in drugs and monomer in polymer etc.
14.	HPLC	Perkin Elmer Series 200	Diode array detector; RI detector System; Size exclusion chromatography for molecular weight estimation; Column switching accessory	Separation and detection of different components of complex mixtures; Qualitative/quantitative analysis.
15.	Gel Permeation Chromatography	Perkin Elmer 200	Range: 580-10 <sup>7</sup> mw; PLGEL calibration standard (Polystyrene)	Analysis of molecular weight distribution in polymers, resins, oils, oligomers and organic compounds.

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16.	CHNSO Elemental Analyzer	Perkin Elmer PE 2400	Absolute CHN, CHNS, O modes of operations; Accuracy: $\pm 0.3\%$ ; 60 samples autosampler	Analysis/estimation of C, H, N, S, O in solid samples.
17.	UV-VIS-NIR Spectrometer	Perkin Elmer Lambda 19	Range: 180-3200 nm; Diffuse reflectance attachment; Colour matching software; Standards for wavelength and absorption calibration validation traceable to NIST	All types of measurements/studies in the region including Absorbance, Transmission and Reflectance spectra; Quantitative analysis.
18.	FT-IR Spectrometer	Perkin Elmer Spectrum GX	Range: 30-15600 $\text{cm}^{-1}$ ; ATR accessory for reflectance measurement; IR Quant software; Spectrum search software	Identification and functional groups of organic/ inorganic, biological and polymer compounds etc.
19	Universal Testing Machine	Simadzu AG 100 KNG	Range: 1 kgf to 10,000 kgf load cells	Bending, compression, Tensile & Inter laminar shear testing of materials.
20.	Micro Hardness Tester	Shimadzu HMV 2T	Load range: 20 gms to 2 kg; Knoop and Vicker's indenter; 35 mm camera attachment	Measurement of surface hardness, hardness of coating as well as parent material.
21.	Liquid Nitrogen Plant	Sterling PLN 108S	Production capacity: 8 lts per hr.	Liquid nitrogen for R&D work.
22.	Deionized Water Plant	Millipore ELIX 3, 10 and Milli Q	HPLC grade water quality; Production capacity: 10 lts. per hr.	Deionised water for R&D work.