



SOPHISTICATED INSTRUMENTATION CENTRE FOR APPLIED RESEARCH & TESTING (SICART)

Sophisticated Analytical Instrumentation Facility (SAIF)

(Sponsored by Department of Science and Technology, Govt. of India, New Delhi)
(Managed by Charutar Vidya Mandal)

Sardar Patel Centre for Science and Technology

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Er. Shri Bhikhubhai B. Patel
Chairman, CVM & SICART

Charutar Vidya Mandal (CVM)

Charutar Vidya Mandal (CVM): CVM is the largest educational trust in the Gujarat State. It was established in 1945 by eminent engineer Shri Bhailalbai Patel and eminent educationist Shri Bhikhabhai Patel. CVM established the educational township "Vallabh Vidyanagar" in 1946. It also established about fifty educational institutes from primary school to the university. CVM University was established in 2020. CVM is recognized by DSIR, Govt. of India, as Scientific and Industrial Research Organization (SIRO). SICART was established by CVM in the year 1998.



SICART is sponsored by Department of Science and Technology (DST), Govt. of India under DST Scheme "Sophisticated Analytical Instrument Facility (SAIF)". A broad range of state-of-the-art analytical instruments are housed in about 10,000 square meters area under one roof. It is also recognized by CVM University for Ph.D. Program. SICART is FDCA (Gujarat) Approved Laboratory for testing of Pharmaceutical Raw Materials and Finished Products. For scope related to NABL accreditation please visit our website: www.sicart.res.in

Vision:

To serve the society by providing analytical services to industries, R & D organizations and academic institutions that pursue scientific research.

Objectives:

1. To provide testing services to Industries, R & D organizations and Academic Institutions.
2. To develop, standardize and validate analytical methods.
3. To organize training programs on applications of analytical techniques and to provide hands-on-training on analytical instruments.
4. To provide consultancy services to solve analytical problems.
5. To undertake sponsored Research Projects from Industries and the government.
6. To disseminate information about SICART, to scientific community, national laboratories and industries of our country and to network with them.

SICART is recognized as Schedule-I, External Environmental Auditor by Gujarat Pollution Control Board.

SICART provides following services for Environment Analysis / Monitoring:

- Portable water & Waste water Analysis
- Solid waste Analysis
- Soil Analysis
- Stack Pollution Monitoring
- Environment Audit and Consultancy Services



Sophisticated Analytical Instrumentation Facility



FEG - Transmission Electron Microscope (HR-TEM)

Thermo Fisher Scientific, Talos F200i S/TEM

Electron Source: Schottky Field emitter (Field Emission Gun), Line Resolution 0.10 nm, Point Resolution < 0.25 nm or less. Magnification: 50x to 1Mx, HAADF Detector, STEM Magnification: Up to 330 Mx, EDS or EDAX: Bruker X Flash 6 30 EDS Detector, Camera: 4K X 4K Ceta 16M Camera, To study Morphology of Nanoparticles. Quantitative Elemental analysis and elemental Mapping can be done on this facility.



Field Emission Gun Scanning Electron Microscopy (FEG-SEM) with Bruker XFlash 7 EDAX

Make: FEI Ltd Model: Nova NanoSEM 450

Resolution : 1.0 nm at 15kV, 1.4nm at 1kV, 3.5nm at 100V, Accelerating Voltage : 20V to 30kV, Beam current: up to 200nA, Magnification: X25 to X10,00,000, Field Emission Gun: Ultra-high brightness Schottky emitter with Energy Dispersive X-Ray analysis for qualitative elements analysis. To study the surface morphology along with elemental composition



LC-MS-MS (LCQ Fleet, TSQ Quantum Access)

ThermoFisher scientific, USA, LCQ fleet and TSQ Quantum, Access: ESI and APCI Source Quantum with HPLC System, Mass range: LCQ Fleet: 50-2000 Daltons, TSQ-30-3000 Daltons, Pump: dual piston delivery system, built-in vacuum degasser., Pressure range: 0 to 5800 PSI (0 to 400 bar) at flow rates up to 2 ml/min., Operating temperature: 10°C to 40°C. Quaternary low pressure system. Useful for identification, qualitative and quantitative analysis of drugs and chemicals



Gas Chromatography with Mass Spectrometry (GC-MS)

Perkin Elmer, USA, System XL with NIST Library, Analyser: Single Quadrupole with prefilter, Mass range: 20-620 Daltons (amu), Mass stability: 0.1m/z mass accuracy over 48 hours, Ionization modes: electro ionization positive / negative, chemical ionization. Identification of volatile organic compound



Gas Chromatography with Head Space (GC-HS)

Perkin Elmer, USA, Auto System XL

Detector: FID (100 °C - 450°C), TCD (100 °C - 350°C) Detector, NPD and ECD, Auto sampler. Detection of residual solvent in non volatile samples



Gel Permeation Chromatography (GPC)

Perkin Elmer, USA, Series-200

Column : PL gel Mixed-D, PL gel Mixed-B. Molecular Weight distribution (range: 500-300000gm/mol) Detector: Refractive Index (RI). Determinations of Molecular weight of Polymer samples (Mn & Mw), Polydispersity.



High Performance Liquid Chromatography (HPLC)

Waters, Series 2998, Binary Gradient System, Flow rate: - 0.01 to 10 ml/min variable, Operating back pressure: - 4000 psi, C18, C8 Column, Detector: - Photo diode array (PDA), Range: - 190nm to 800nm, Sensitivity range: - 0.0001 to 2.0 AUS. Qualitative and quantitative analysis of organic compound.



High Performance Thin Layer Chromatography (HPTLC)

Camag-Switzerland WinCat. Automatic applicator (Linomat-5) of selectable sample volume. GMP, GLP compliant image plate scanner-3 and documentation (reproster-3) system. Scane range :(190nm to 800nm) Deuterium lamp, tungsten lamp and mercury lamp. Screening, Identification, qualitative and quantitative analysis of pharma drugs



400 MHz FT-NMR Spectrometer (FT-NMR)

Model- Bruker, Switzerland, Avance III, Topspin 2.1, Liquid and Solid multi nuclei probe, Low-Temperature Facility (Range up to -80°C), Timing Resolution 12.5 ns, Minimum event time 25 ns, Single Chip RF generation, Highest Phase resolution (0.0055°), Highest Frequency resolution (0.005 Hz), Solid nuclei (^{31}P , ^{29}Si , ^{23}Na , ^{27}Al , ^{51}V , ^{71}Ga , ^{119}Sn , ^{201}Pb), Useful for structure identification of organic, inorganic and polymer compound.



Fourier Transform Infrared Spectrometer (FTIR)

Make: Shimadzu Model: IRSpirit
Operating Mode:- MIR, Detector: DLATGS detector,
Range: 4000 cm^{-1} to 400 cm^{-1} , Resolution: 2.0 cm^{-1}
Optical system: Single-beam optics, Single Reflection Diamond ATR, KR5-5 Window
Identification of Functional groups in Chemicals.



UV-VIS-NIR Spectrometer

LAMBDA 1050+, Perkin Elmer, U.S.A
Wavelength Range: 180-3300 nm for Absorbance/Transmission and 200-2500 for Reflectance, Lamp: Tungsten, Halogen, Deuterium, Detectors: Photomultiplier tube (PMT), Lead sulfide (PbS), Solid sample attachment: Tungsten- Lead-Sulphide cell (PbS) for NIR Double Beam, Double monochromator. To study wavelength maxima, concentration of unknown sample, band gap of the semiconductor crystal, optical density, materials optical properties and its concentration.



Particle Size Analyzer (PSA)

Malvern Panalytical – Mastersizer 3000, UK
Laser Diffraction Particle Size Determination System
Particle Size Range : 0.1 - $3500\mu\text{m}$ (Dry and Wet modes)
Suitable for particle size determination of Chemicals and Pharmaceuticals.



X-Ray Diffractometer (XRD)

Bruker, D8 Advance

Source: Cu target X-Ray tube, X-Ray Power: 2KW, Detector: LYNXEYE XE-T is based on silicon strip technology, Software: DIFFRAC. EVA, 2θ Angular range: $<1\text{ to }150$, Diffractometer radius: 2 to 136, To study phase identification, quantitative phase analysis, reitveld refinement and structure analysis.



Thermal Analysis (DSC) Differential Scanning Calorimeter

Perkin Elmer, USA

Model: DSC-8000, Temperature Range: $(-40\text{ }^{\circ}\text{C to }400\text{ }^{\circ}\text{C})$, Heating Rate: $0.1\text{ to }100\text{ }^{\circ}\text{C / min}$, Sensitivity: $0.1\text{ m gm (0.0001mg)}$, Atmosphere: Nitrogen, To measure Melting behaviour, Crystallization, Glass Transitions Temperature, Specific heat, Polymorphism, Kinetic Studies, Curing Reaction.



Simultaneous Thermal Analyzer (STA)

Perkin Elmer, USA. Model- STA 8000.

Specification - Simultaneous analysis of TGA with DTA mode and DSC. Temperature- $30\text{ }^{\circ}\text{C to }1000\text{ }^{\circ}\text{C}$, Atmosphere: Nitrogen. Simultaneous application of TGA with DTA



Thermogravimetric Analyzer (TGA)

Perkin Elmer, USA, Model: TGA-4000

Temperature range: Ambient to $1000\text{ }^{\circ}\text{C}$, Heating Rate: $0.1\text{ to }100\text{ }^{\circ}\text{C / min}$, Atmosphere: Nitrogen or Air, To characterize weight loss & decomposition temperature of materials.



Wavelength Dispersive-X-Ray Fluorescence (WD-XRF)

Description: 4 kW , WD-XRF sequential basic system, X ray tube: Ultra thin Be window ($75\mu\text{m}$) Detectors: Scintillation and flow counter detection Software: Omnian software, TOXAL module, WROXI Mineral and mining Modules. Measurement of metal and metal oxide



Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES), Perkin Elmer, USA, Avio 200

RF frequency : 40 MHz , RF power : $1000\text{ to }1500\text{ watts}$, Pump: 4 Channel peristaltic pump : $0.2\text{ to }7.0\text{ ml/min}$, Charged Coupled Device (CCD) Array Detector, Range : $165 - 900\text{ nm}$, Resolution: $<0.009\text{ nm @}200\text{ nm}$. To study trace level cation elements.



CHNS/O Elemental Analyzer

Unicube, Elemetar Analysensysteme, GmbH, Germany
Elements that can be analyzed: Carbon, Hydrogen, Nitrogen, Sulfur and Oxygen, Operating Mode: CHNS and OXYGEN, Accuracy: 0.4 % abs, Analysis Time: 7-10 minutes per sample. Measurement of % C, H, N, S, O in various samples



Total Organic Carbon (TOC) Analyzer

Shimadzu, Japan, TOC-VCSN/TNM-1
Measurement range: Total Carbon: 0 to 25000 mg/l; Inorganic Carbon: 0 to 3000 mg/l; Total Nitrogen: 0 to 4000 mg/l; Measurement Time: 10 minute per sample. Measurement of TOC in water and wastewater sample



Universal Testing Machine (UTM)

Shimadzu, Japan, AG 100 KNG, Capacity:100KN (10000 kgf),Load measuring accuracy : $\pm 0.5\%$ of indicated load ,cross head speed range:0.05 to 1000mm/min, Cross head speed precision: ± 0.1 ,Effective test width :575mm,Load cell of 100KN,1kgf. Measurement of tensile, compression and flexural strength



Ambient Air Quality Monitoring Mobile Van

(Environment SA, France), Measurement of Carbon monoxide, Total hydrocarbons, Oxides of nitrogen, Ozone, Particulate matter, Sulphur dioxide and meteorological parameters



Contact

Interested researchers, scientists and engineers from industries, R&D centres and Universities are invited to get in touch with the Director, SICART, for their needs in testing, analysis and measurement of samples, solution of specific R&D problems, short-term courses, consultancy, training etc.

You are invited...

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