SOPHISTICATED INSTRUMENTATION CENTRE FOR APPLIED RESEARCH AND TESTING (SICART)

(Under SAIF- Sophisticated Analytical Instruments Facility by DST, New Delhi)

(Sponsored by Department of Science & Technology, Govt. of India, New Delhi)

NABL Accredited Laboratory, Certificate No. TC-5124

Sardar Patel Center for Science & Technology

Charutar Vidya Mandal

Vallabh Vidyanagar – 388120, Dist. Anand, Gujarat, India

Phone: +91-2692-234966, +91-2692-238355

E-mail: sicart_cvm@hotmail.com

sicartcvm@sicart.res.in

Website : www.sicart.res.in

Inauguration Picture of SICART

Major Objectives of SICART

A. Vision:

1. To create better societal impact by providing scientific analytical services to the industry and academic institutes perusing scientific research.
2. Expansion of basic research areas to its explicit applications.
3. To help in technical analysis for institutionalization or developing, standardization and validation of developing methods in order to promising usage of unexplored resources.
4. To organize short- and long-term training workshops/programs on the applications and uses of various analytical techniques for researchers/ industrial users with purpose to sort out their academic task on their focused areas.
5. To motivate young researchers for generating innovative ideas from the experimental findings.

B. Mission:

1. To acquire newfangled sophisticated analytical instruments.
2. To develop capability for preventive maintenance, upgradation of the high-end instruments and timely replacement of old facilities.
3. Exploring new MOUs and agreements with industries, academic and research centers.
4. To carry out industrial or government sponsored research projects.
5. To provide consistent consultative approach and help towards solving analytical problems.
6. To contribute in effective networking and dissemination of Institute's sophisticated instruments to the scientific community across the state and country in general.

Authorization

1. Sophisticated Analytical Instruments Facility Supported by Department of Science & Technology (Govt. of India).
2. Recognized by DSIR as a Research Centre.
3. Recognized by Gujarat Pollution Control Board as Environmental Auditor, Schedule- I.
4. Accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL)
5. Recognized by Charutar Vidya Mandal University and Sardar Patel University as Research Centre for Ph.D. study.

List of Technical Staff

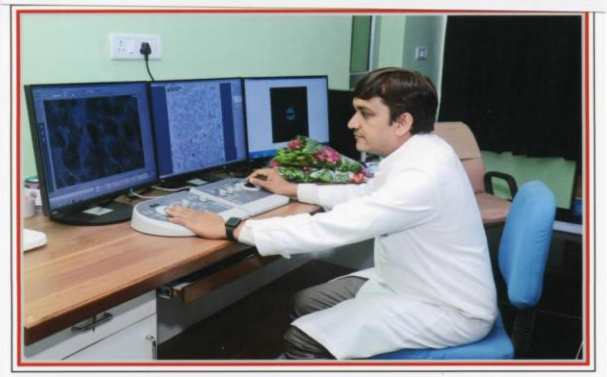
Sr. No.	Employee Name	Designation	Qualification
1	Dr. R. H. Parikh	Hon. Director	M. Pharm, Ph.D. (Pharmacy)
2	Dr. K. K. Tiwari	Sr. Scientific Officer	M.Sc (Environment Science) Ph.D. (Ecotoxicology)
3	Dr. M. R. Tiwari	Sr. Scientific Officer	M.Sc. (Inorganic Chemistry) Ph.D. (Industrial Chemistry)
4	Dr. G. R. Chauhan	Sr. Scientific Officer	M.Sc. (Analytical Chemistry) Ph.D. (Chemistry)
5	Mr. Vipul J. Patel	Jr. Scientific Officer	M.Sc. (Solid State Physics)
6	Mr. Vikas A. Patel	Jr. Scientific Officer	M.Sc. (Electronics) PhD Pursuing
7	Ms. Dhanvi Patel	Technical Assistant	M. Sc. (BioTechnology)
8	Mr. Dipen Patel	Technical Assistant	M.Sc. (Analytical Chemistry)
9	Ms. Daxa Patel	Technical Assistant	M.Sc. (Organic Chemistry)
10	Mr. Kartik Patel	Technical Assistant	M. Pharm (Quality Assurance)
11	Dr. Hiral Soni	Technical Assistant	M.Sc., Ph.D. (Biotechnology)
12	Mr. Savan Patel	Trainee Technical Assistant	M.Sc. (Industrial Chemistry) PhD Pursuing
13	Mr. Hardik Parekh	Trainee Technical Assistant	M.Sc. (Environmental Biotechnology), PhD Pursuing

Sophisticated Instrumentation Facility Available in SICART

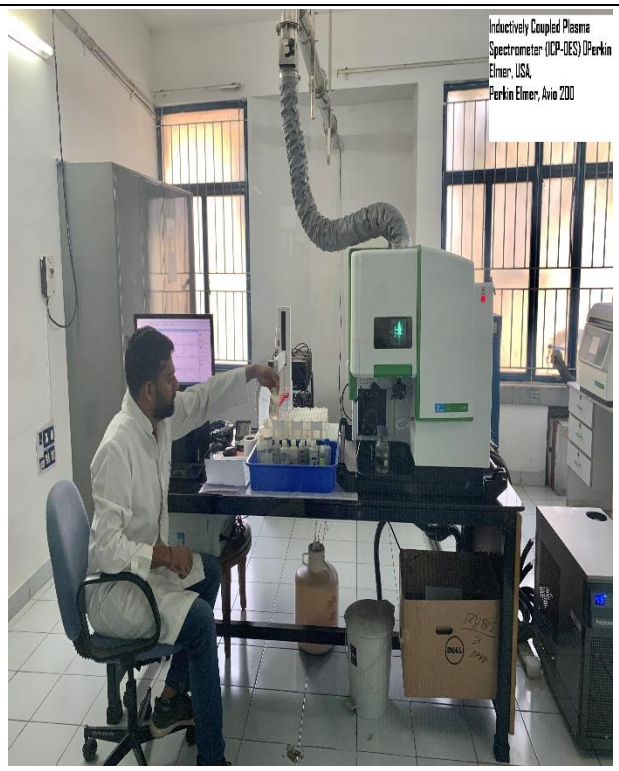
1.	**Field Emission Gun Scanning Electron Microscopy (FEG-SEM)** **Make**: **FEI Ltd** Model: **Nova Nano SEM 450**
Resolution:	1.0nm at 15kV,1.4nm at 1kV, 3.5nm at 100V
Accelerating Voltage:	20V to 30kV
Beam current:	up to 200nA
Magnification:	X25 to X10,00,000
Field Emission Gun:	Ultra-high brightness Schottky emitter
Major Applications:	Detection and quantification of elements down to boron. Surface analysis of samples such as semiconductor, metals, geological, pharmaceutical, bio-materials, ceramics, etc. Mapping of different metals in samples can be analyzed

2.	**Transmission Electron Microscope (TEM) 200 kV Technai-20, Phillips, Holland**
Electron Source:	LaB6 and Tungsten Filament
Accelerating Voltage:	200KV
Point Resolution:	0.27nm
Magnification:	25x to 7,50,000x
Sample holder	Single tilt
Sample preparation accessories	Ultramicrotome and ultracutter
Major Applications	Morphology, crystal structure, particle size, interface structure, crystal defects, Single crystal Diffraction, biological microbes can be studied.

3.	**FEG - TRANSMISSION ELECTRON MICROSCOPE (HR-TEM),** Thermo Fisher Scientific, Talos F200i S/TEM
Electron Source:	Schottky Field emitter (Field Emission Gun)
Resolution:	Line Resolution 0.10 nm, Point Resolution less than 0.25 nm or less
Magnification:	FEG-TEM Magnification 50x to 1Mx
STEM Detector:	High Angle Annular Dark Field Detector (HAADAF)
STEM Resolution:	less than 0.16nm
STEM Magnification	Up to 330 Mx
EDS or EDAX:	Bruker X Flash 6 30 EDS Detector
Camera:	4K X 4K Ceta 16M Camera
Major Application	Morphology, crystal structure, particle size, interface structure, crystal defects, Single crystal Diffraction, biological microbes, pharma samples, thin films, catalysts, Nanoparticles, polymer samples can be studied. Quantitative Elemental analysis and elemental Mapping can be done on this facility.



4.	**Inductively Coupled Plasma Optical Emission Spectrometer (ICP- OES) Perkin Elmer, USA, Avio 200**
RF frequency:	40MHz
RF power:	1000 to 1500 watts (Power efficiency greater than 81%)
Pump:	4 Channel peristaltic pump; 0.2 to 7.0 ml/min in 0.1ml increments
Spectrometer:	Charged Coupled Device (CCD) Array Detector
Range:	165 – 900 nm
Resolution:	<0.009 nm @200nm
Major Applications	Analysis of cation elements from various samples (Environment, metal alloys, chemicals, minerals, pharmaceuticals, polymers, pigments, mining, etc.)



5.	**X- Ray Diffractometer (XRD) Philips, Holland, X-pert MPD**
Source:	Cu target X-Ray tube
X-Ray Power:	2KW
Detector:	Xe-filled Proportional detector
Software:	JCPD data base for powder diffractometry
2 Ɵ Measurement range:	2 to 136
Diffractometer radius:	130 to 230mm
Major Applications	X-ray diffraction is widely used to identify crystalline phases, measure crystallite sizes, lattice parameters, orientation and provide quantitative phase analysis and atomic coordinates.

6.	**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:	DIFFARAC. EVA
2Ɵ Measurement range:	130 to 230mm
Diffractometer radius:	2 to 136,
Major Applications : X-	The D8 Advanced is all-purpose Ray analyzer which is configured for all powder diffraction application, Including phase identification, quantitative phase analysis, reitveld refinement and structure analysis.

7.	**Wavelength Dispersive-X-Ray Fluorescence (WD-XRF)**	
Description:	4Kw WD-XRF sequential basic system	
X ray tube:	Ultra thin Be window (75µm)	
Detectors:	Scintillation and flow counter detection	
Software:	Omnian software TOXAL module WROXI Mineral and mining Modules.	
Major Applications:	XRF can be used to analyze elemental composition from metals, cement, Soil samples, Mining, Steel, Ceramic and glass manufacturing, Metallurgy, Hazardous waste analysis, Petroleum industry, geological samples, ceramic, glass industries, pharmaceuticals, plastics and food industries.	

8.	**400 MHz FT-NMR Spectrometer (FT-NMR) Model- Bruker, Switzerland, Avance III, Topspin 2.1**	
Liquid and Solid multi nuclei probe		
Single Chip RF generation		
Timing Resolution	12.5 ns	
Minimum event time	25 ns	
Highest Phase resolution	(0.0055°)	
Highest Frequency resolution	(0.005 Hz)	
Solid nuclei	(31P ,29Si ,23Na ,27Al ,51V,71Ga, 119Sn ,201Pb)	
Major Applications :	NMR is useful for structure identification of organic, inorganic and polymer compounds.	

9.	**Fourier Transform Infrared Spectrometer (FTIR) Perkin Elmer, USA: Spectrum-GX**

Normal range:	4000-400 cm^{-1}
Operating Mode:	MIR
Scanning range:	4000-400 cm^{-1}
Scan time:	20scan/second
Resolution:	0.15cm^{-1}
Single Beam/Ratio:	Single, Detector: MIRTGS
Major Applications:	It is used for qualitative and quantitative analysis for organic and inorganic and pharmaceutical samples.

10.	**UV-VIS-NIR Spectrometer, Perkin Elmer, USA, Lambda 19**

Wavelength Range:	185-3200 nm for Absorbance/Transmission and 200-2500 for Reflectance
Ratio Recording Lamp:	Halogen (VIS/NIR)
Detectors:	Photomultiplier tube for UV/Vis
Solid sample attachment:	Tungsten-Lead-Sulphide cell (PbS) for NIR
Double Beam	Double Monochromator, Deuterium (UV)
Major Applications :	To find out wavelength maxima, unknown sample concentration, band gap of the semiconductor crystal, optical density, materials optical properties and its concentration.

11.	**LC-MS-MS (LCQ Fleet, TSQ Quantum Access)** **Thermo fisher scientific, USA**

LCQ fleet and TSQ Quantum Access with Surveyor plus HPLC System

Mass range:	LCQ Fleet: 50-2000 Daltons, TSQ Quantum Access: 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:	5°C to 95°C.
Major Applications:	Compound detection and structural identification of drugs, organic intermediate compound and non-volatile compounds, natural products, pharmaceuticals, environmental samples, clinical and forensics research samples.

12.	**High Performance Liquid Chromatography (HPLC) Perkin Elmer, USA, Series-200**

Quaternary gradient system

Flow rate	1 to 2 ml/min
Variable operating back pressure	6200 PSI
Column	C-18, C-8 column
Detectors:	Photo Diode Array (PDA), UV-Visible and Fluorescence Detector
UV- Visible detector Range:	190nm to 800nm
PDA detector range	200 to 800nm
Florescence Detector range	200nm to 900nm
Sensitivity range	0.0001 to 2.0 AUS
Major Applications:	Non- volatile compound detection from pharma, environment, forensic, clinical, food beverage samples, etc.

13.	**Gel Permeation Chromatography (GPC)** **Perkin Elmer, USA, Series-200**

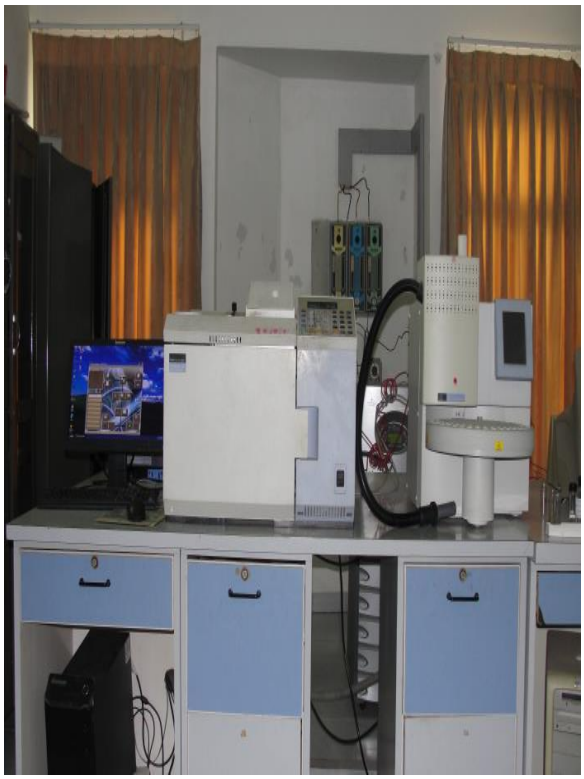
Column:	PL gel, Mixed-B, Mixed-D.
Molecular Weight distribution	Range: 500-300000gm/mol
Detector:	Refractive Index (RI)
Major Applications:	Determinations of Molecular weight of Polymer samples (Mn & Mw), Polydispersity.

14.	**High Performance Thin Layer Chromatograph (HPTLC)** **Camag-Switzerland WinCat**

Automatic applicator (Linomat-5) of selectable sample volume.	
GMP, GLP compliant image plate scanner-3 and documentation (reproster-3) system	
Scan range:	190nm to 800nm
Lamp	Deuterium lamp tungsten lamp and mercury lamp
Major Applications:	Separation, identification and screening of complex mixtures of amino acid, purines, nucleotides, toxic & carcinogenic compounds, drugs, antibiotics, vitamins, insecticides, pesticides, etc.

15.	**Gas Chromatography with Head Space Perkin Elmer, USA, Auto System XL**

Detector:	FID (100 ^{o}C - 450^{o}C), TCD (100 ^{o}C - 350^{o}C) Detector NPD and ECD Detector
Major Applications:	Useful for finding % purity and impurity profile in solvents, gases (like methane, carbon dioxide, nitrogen, etc.) Petroleum products, Flavors, Drugs, Pesticides, etc.



16.	**Gas Chromatograph with mass spectroscopy (GC-MS) Perkin Elmer, USA, System XL with NIST Library**

Analyser:	Single Quadrupole with prefilter
Mass range:	20-610 Daltans (amu)
Mass stability	0.1m/z mass accuracy over 48 hours
Ionization modes:	Electro ionization positive / negative, chemical ionization
Major Applications:	Identification of volatile organic compounds from Environmental, Flavors, Fragrances, Pharmaceuticals, Organic, Petrochemicals, Fine Chemicals samples, etc.

17.	**Particle Size Analyzer (PSA), Symantec-HELOS-BF, Germany**

Laser Diffraction **particle size determination**	
System Particle size range	0.1µm to 875 µm
Accuracy for Dry and Liquid sample	
Major Applications:	To find the size of particles, particle size distribution in the suspension, emulsions & powder material.

18.	**CHN/S/O Elemental Analyzer 2400 Series II, Perkin Elmer, USA**

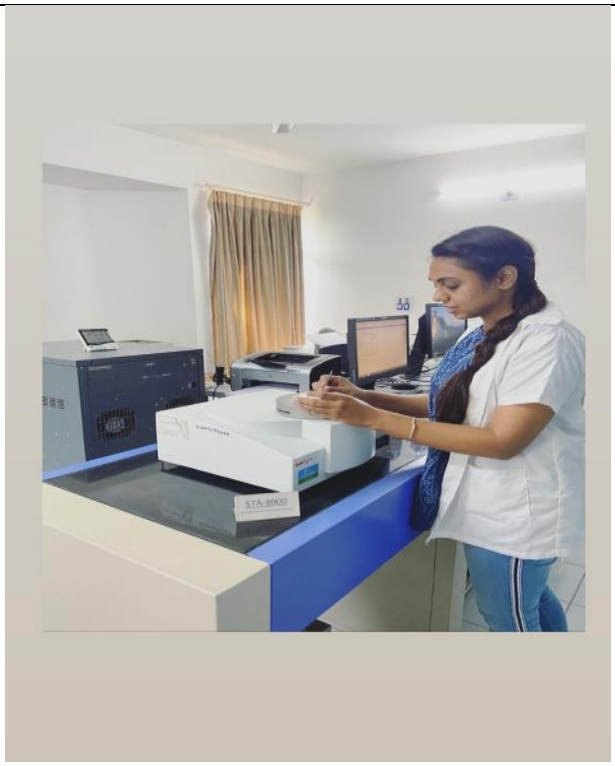
Analyzed Elements:	Carbon, Hydrogen, Nitrogen, Sulfur and Oxygen
Operating Mode:	CHN, CHNS and OXYGEN
Accuracy:	0.3 % abs
Analysis Time:	6 to 8 minutes per sample
Major Applications:	To analyze the concentration & percentage of C,H,N,S & O from powder samples of newly synthesized compounds, catalysts, petrochemicals, Coal & Coke, Graphite, environmental, Polymers etc.

19.	**Thermal Analysis (DSC, STA), Perkin Elmer, USA**

Model:	DSC-8000
Temperature Range:	(-35 °C to 400 °C)
Heating Rate:	0.1 to 100 °C / min
Sensitivity:	0.1m gm (0.0001mg)
Atmosphere:	Nitrogen
Major Applications:	Differential scanning calorimeter measures Melting, Crystallization, Glass Transitions Temperature, Crystallinity, Specific heat, Polymorphism, Kinetic Studies, Curing Reaction. Used in characterization of polymorphism in pharmaceuticals, Characterization of pharmaceuticals formulations.

20.	**Thermal Analysis (STA), Perkin Elmer, USA**

Model-	STA 8000
Specification -	Simultaneous analysis of TG with DTA mode and DSC.
Temperature Range:	30°C to 1000°C
Temperature Accuracy:	± 0.2 °C
Heating Rate:	0.1 to 100 °C / min
Atmosphere:	Nitrogen
Major Applications:	Widely used in polymer, pharmaceuticals, cosmetics industry etc.



21.	**Thermal Analysis System (TGA), Perkin Elmer, USA**
Model	TGA-4000
Temperature range:	Ambient to 1000 °C
Heating Rate:	0.1 to 100 °C / min
Atmosphere:	Nitrogen or Air
Major Applications:	To characterize multicomponent materials. Widely used in polymer, pharmaceuticals, metals, metal oxides, cosmetics industry etc.

22.	**Universal Testing Machine (UTM), Shimadzu, Japan, AG 100 KNG**
Capacity:	100KN (10000 kgf)
Load measuring accuracy:	±0.5% of indicated load
Cross head speed range:	0.05 to 1000mm/min
Cross head speed precision:	±0.1
Effective test width:	575nm
Load cell of	100kN, 5kN, 1kgf
Major Applications:	To measure Tensile strength of Fabrics, Tires, Cords, Polymers, Plastics, Rubber, Steel, Composite etc. Compression tests, bending test, inter laminar shear strength (ILSS).

23.	**Total Organic Carbon (TOC) Analyzer Shimadzu, Japan, TOC-VCSN/TNM-1**
Measurement range of 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
Major Applications:	For rapid measurement of even small quantity of organic matter in samples of wastewater, soil, sludge, sediments etc., and determination of degree of contamination.

24.	**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
Major Applications:	Monitoring emissions from stationary sources, Measurement of environment quality in the workplace, Continuous Ambient Air Quality monitoring, Assessment of hazardous situation in plant operations, and characterization of atmospheric stability

25.	**Environmental Analysis/ Monitoring/ Auditing Facilities**	Water and wastewater analysis
		Solid waste and soil analysis
		Stack pollution monitoring
		Environmental Audit and Environmental Consultancy Services
		Environmental Research &Development

Contact for more information:

Dr. R. H. Parikh,
Hon. Director
Sophisticated Instrumentation Centre for Applied Research and Testing (SICART),
(Sponsored by Department of Science and Technology, Govt. of India, New Delhi)
Sardar Patel Centre for Science and Technology
Vallabh Vidyanagar – 388120, Dist: Anand, Gujarat, INDIA
Phone: +91-2692-234966, +91-2692-238355
E-mail: directorsicart@gmail.com
sicart_cvm@hotmail.com
sicartcvm@sicart.res.in
Social Media pages: Facebook: sicart cvm
Instagram: sicartcvm