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Technical Specification for Gas Chromatography System

Sr. No.	Specifications		Compliance
01	<p>Automatic, computer-controlled Gas Chromatograph Analyser with TCD, Dual FID and Methanizer required for analysis of gaseous mixtures generated during below reactions:</p> <p>1) CO₂ reduction experiment: H₂ – 50ppm to 50% CO – 1ppm to 1%CH₄ – 1ppm to 1% C₂H₄–1ppmto1% CO₂ – 0.1% to 80% Ar–Bulk</p> <p>Solvents used in reaction – Acetonitrile /DMF/Propylene Carbonate. Fumes may be present in sample.</p> <p>2) Water Splitting reaction: H₂ – 50 ppm to 50% O₂–100 ppm to 50% Water vapors– ppm to % level Argon–Bulk</p> <p>The scope of supply consists of installation, commissioning, training of system at IIT Bombay laboratory. System to be supplied with method set up parameters, plumbing diagram, and schematics from factory. Below are minimum specifications required for the Gas chromatograph system. Pre-column with back flush should be provided to handle water vapour and fumes of organic solvents.</p>		
2.	GC	Large Graphical LCD based display to view real time Chromatogram and their Parameters such as temperature sensors and carrier gas	

		Supply pressure.	
		An automatic computer controlled dual channel gas chromatographic system, capillary/ packed columns, oven, flow control systems, FID, Methanizer, TCD, gas sampling valves with appropriate loops & fittings, pressure balance valves for automatic sampling and powerful and versatile software capable of analysing gases / liquid is required. The Valves must be factory fitted only in the dedicated option box.	
		Should be capable of mounting 3 injectors and 4Detectors.	
		Should be equipped with Intelligent self-diagnostic functions for detailed diagnosis of the septum, glass insert usage status, Temperature sensor error, gas supply pressure, status of each gas ignition function etc.	
		Should be manufactured as per ISO9001 and in full compliance with international regulatory, safety, and electromagnetic compatibility requirements	
3	Column Oven		
	Capacity	Minimum 15L or above	
	Temperature Range	Ambient+10°C to 400°C	
	Temperature Program ramps	Minimum 20 or more	
	Max temperature program rate	Minimum 60°C/minor more	
	Cooling time	300°C to 50°C within 6 min(at 25°C ambient temperature)or faster	
	Maximum runtime	At least 9999 min or more	
4	Automatic Gas Sampling Valves	Factory fitted, pneumatic 6 and 10 port gas sampling valve (Valco Make only) 2 nos each in combination for both gas samples analysis. Vendor to submit the Plumbing diagram with technical bid.	
5	Thermal Conductivity Detector	One	

	(TCD)		
	Max Operating temperature	400°C or more	
	Sensitivity	200 pg tri-decane/mL or <10 microvolt per ppm or >40000 mV x mL/mg (Decane)	
	Dynamic range	10 ⁵ or better	
6	Flame Ionization Detector (FID)	Dual FID	
	Max Operating temperature	400°C or more	
	Minimum detectable quantity-MDQ	3 pg C/s (Dodecane) or better	
	Dynamic range	10 ⁷ or better	
7	Sample Injector port	Suitable sample injection ports to introduce sample through gas tight syringe.	
8	Automatic Gas Flow/Pressure Controller	Automatically compensates for variations in atmospheric pressure And temperature	
	Pressure range	0 to 140 psi	
	Pressure program ramps	Minimum 7 or more	
9	Software	64-/32-bit Windows 10 compatible workstation software with minimum 4 Channel to be quoted of same make. - Multichannel real time chromatographic data acquisition and post-run analysis should be possible. - Software should be with high-speed data acquisition and bulk analysis compatibility - Full qualitative & quantitative processing functions, multi-function compatibility, GLP/GMP functions, Audit Trail, Validation Assistant, Column Performance function, System Suitability, QA/QC functions - All in-one file configuration for easy data, transfer, customized Report generator, networking capability, data management etc.	
10	Columns	Pre-column 1m or 2m length Porapak-Q, Main packed columns – 2m or 3m length Porapak-Q & Molecular Sieve Column. Also, capillary column – Alumina Plot 0.53mm ID X 10um, suitable for intended	

		Analysis of gaseous samples from both reaction types.	
11	GC Plumbing	Suitable sample loop, gas supply pipes & OEM make filter kit should be included.	
12	Calibration gas blend	Suitable calibration gas blend containing known certified concentrations of H ₂ , O ₂ , CO, CO ₂ , CH ₄ , C ₂ H ₄ should be provided in 10L capacity cylinder with suitable regulator.	
13	Pre-installation requirements	Suitable branded PC system for GC software should be included. Branded 5KVA online UPS with 30 min backup should be included. Gas Purification panels for Ar, H ₂ and Zero Air with tubing and installation parts should be provided.	
14	Warranty	12 months from date of installation.	
15	Installation & training	Installation of the instrument to be done at IIT Bombay campus, at free of cost. Operational training to be provided to respective group of research fellows.	