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CPPP Tender ID : 2024_CSIR_220677_1

Dt: 31-12-2024

Minutes of Pre-Bid Conference (PBC) held on 31-12-2024 for proposed procurement of "Supply, installation and commissioning of **High Precision Extremely Low and High Pressure Gas Sorption Analyser**"

Chairpersons / Members of the Technical Sub Committee (TSC) present during PBC including domain experts present during PBC:-

1. Dr. N.Lingaiah, Chairman
2. Dr. PratyayBasak, Member
3. Dr. G.Jithender Reddy, Member
4. Sri. D. Venkateswara Rao, Member
5. Dr. SreepriyaVedantam, Member
6. IO/Co-PI Dr. Pravin Likhar

Representatives of the following firm attended the PBC:

1. M/s Verder Scientific Private Limited
2. M/s Micromeritics Instrument Corp.

The following points were discussed during the PBC:

Query raised by M/s. Verder Scientific Private Limited, and response of CSIR-IICT:

Query-1: The title of the tender includes the name High-Pressure Gas Sorption Analyzer, however specification for the high-pressure port is not mentioned in the tender specifications.

Response: Based on PI/Co-PI request, the committee suggested a low-pressure unit, then the title will be amended with '**High Precision Extremely Low Pressure Gas Sorption Analyzer**' (New title of equipment).

Query-2: System should be equipped with Vapor option for vapor sorption studies minimum on 3 ports.

Response: System should be equipped with Vapor option for vapor sorption studies minimum on 2 or more ports.

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Query-3: Ensure a minimum of 4 measurement ports, with specifications for micropore and mesopore analysis, including pressure transducers of 0.1 Torr, 10 Torr, and 1000 Torr. ONE sample port should be capable of measuring adsorption / desorption isotherms up to (9 Bar) pressure or higher (fitted with at least one pressure transducer in range of ~10 Bar)

Response: A minimum of 3 or more ports should be capable of simultaneous and parallel analysis for measuring micropore, mesopore, etc. All these ports or atleast one port should be suitable for micropore analysis and be equipped with 1000Torr, 10Torr and 0.1 Torr sensors. Based on PI/Co-PI request, the committee suggested a low-pressure unit, therefore, higher pressure transducer in range of ~10 Bar is not required.

Query-4: Allow for manual or automatic port selection for at least 5 gas inlet connections.

Response: Gas ports for 5 or more gas inlet connections with manual or automatic port selection through software can be allowed.

Query-5: Adjust accuracy requirements for pressure ranges and include one transducer for high-pressure measurements (10 Bar).

Response: Based on PI/Co-PI request, the committee suggested a low-pressure unit, therefore, higher pressure transducer in range of ~10 Bar is not required. Based on PI/Co-PI request, the committee suggested a low-pressure unit, then the title will be amended with '**High Precision Extremely Low Pressure Gas Sorption Analyzer**' (New title of equipment).

Query-6: Enhance provisions for correcting free space changes due to liquid nitrogen evaporation, atmospheric pressure variation, and LN2 temperature changes.

Response: System should have adequate provision to correct the dead volume (free space) change in sample cell due to change in liquid nitrogen (LN2) levels, due to evaporation, change in atmospheric pressure, and change in LN2 temperature due to dissolved contaminants.

Query-7: Physisorption and chemisorption cannot be provided in the same analyser due to certain disadvantages in analysis. Recommended to remove the chemisorption specification from this tender.

Response: PI/Co-PI suggested to go with the volumetric Physisorption unit alone.

Query-8: Detailing of In situ degassing unit will be required.

Response: The details are as follows:

- (a) The In-situ degassing should be in addition to the external degaussing system, this is required for extremely low-pressure measurements and to remove contamination during sample tube changeover from degaussing port to analysis port.
- (b) The in-situ heater should be able to heat samples 50°C to 400°C or more for in all the ports.

M. K. S.

Query-9: Rather than specific programming feature, a general feature will be more suitable for creation of user defined reports.

Response: The specification will be revised to more general way which is as follows: Feature should be available for creation of user defined reports.

Query raised by M/s. Micromeritics Instrument Corp., and response of CSIR-IICT:

Query-1: The Temperature Range of Dewar Chiller should be revised to -10°C to 70°C.

Response: The typo in the temperature range will be revised to -10°C to 70°C.

Query-2: Due to the limited availability and high current cost of 40-liter Kr gas cylinders, it is challenging to meet this specific requirement. It would be more practical to revise the minimum capacity to a 10-liter Kr gas cylinder.

Response: A minimum capacity of a 10-liter Kr gas cylinder will be satisfactory for the current requirement. The specification will be revised.

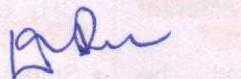
Points clarified by CSIR-IICT Team during PBC:

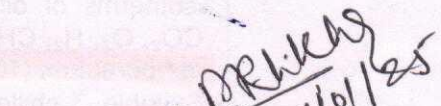
The representatives of the participating firm/further informed that they do not have any issue or suggestion with respect to other points of tendered specifications and related requirements given in the tender document. Participating bidders have been informed that points raised by them during PBC will be examined by CSIR-IICT's **Technical Sub Committee (TSC)/Technical team** constituted for the purpose of procurement of said equipment and **post PBC changes** in tendered specifications and requirements to be agreed after due consideration of the same by TSC, **if any**, will be uploaded in CPPP as part of **revised/amended tendered specifications** along with CSIR-IICT website www.iict.res.in on or before **10-01-2025**. All bidders are requested kindly to take a note of the changes, if any, in tendered specifications subsequent to **PBC** held today, i.e. 31-12-2024 before they start submitting their online bids through CPPP.

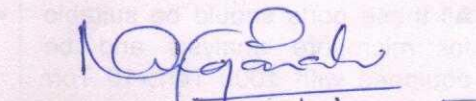

(Dr. Pratyay Basak)
Member


(Dr. Jithender Reddy)
Member


(Dr. Sreepriya Vedantam)
Member


(Sri. D. Venkateswara Rao)
Member


(Dr. Pravin Kumar)
IO/Co-PI


(Dr. N. Lingaiah)
Chairperson

The following changes has been made in the tendered specification subsequent to PBC held on 31.12.2024

S. No.	Existing Specifications	Revised/Amended Specifications
1	<ul style="list-style-type: none"> • Suitable for measurement of surface area, pore size distribution, and adsorption isotherms of various gases at variable temperatures. • The system should be automatic and capable of carrying out physisorption of various gases and should have features to measure the adsorption / desorption isotherms, surface area, pore size distribution of Microporous, Mesopores and Macro porous materials. • System should be equipped with Vapor option for vapor sorption studies minimum on 2 ports. • The system should handle all types of samples in powder, pellet & monolith forms. 	<ul style="list-style-type: none"> • Suitable for measurement of surface area, pore size distribution, and adsorption isotherms of various gases at variable temperatures. • The system should be automatic and capable of carrying out physisorption of various gases and should have features to measure the adsorption / desorption isotherms, surface area, pore size distribution of Microporous, Mesopores and Macro porous materials. • System should be equipped with Vapor option for vapor sorption studies minimum on 2 or more ports. • The system should handle all types of samples in powder, pellet & monolith forms.
4	<ul style="list-style-type: none"> • Simultaneous and parallel analysis with 3 or more analysis ports. All 3 ports should be capable of measuring micropore, mesopore, etc. The system should be suitable for measuring adsorption isotherms of different gases (N₂, CO₂, O₂, H₂, CH₄, etc.) at different temperatures (10°C – 70°C). • Suitable chillers should be provided to maintain temperature in the above range. • All these ports should be suitable for micropore analysis and be equipped with 1000 Torr, 10 Torr and 0.1 Torr sensors. 	<ul style="list-style-type: none"> • Simultaneous and parallel analysis with 3 or more analysis ports. All 3 ports should be capable of measuring micropore, mesopore, etc. The system should be suitable for measuring adsorption isotherms of different gases (N₂, CO₂, O₂, H₂, CH₄, etc.) at different temperatures (-10°C – 70°C). • Suitable chillers should be provided to maintain temperature in the above range. • All these ports should be suitable for micropore analysis and be equipped with 1000 Torr, 10 Torr and 0.1 Torr sensors.
7	<ul style="list-style-type: none"> • Gas ports for 5 or more gas inlet connections with automatic port selection through software. 	<ul style="list-style-type: none"> • Gas ports for 5 or more gas inlet connections with manual or automatic port selection through software.
11	<ul style="list-style-type: none"> • System should have provision to 	<ul style="list-style-type: none"> • System should have provision to

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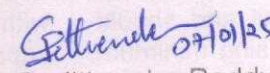
	<p>maintain the coolant level around the sample throughout the analysis, thus avoiding any free space changes within the sample tube.</p> <ul style="list-style-type: none"> • Compensation for the dead volume changes should be made continuously during the measurement. • The system should avoid any moving electromechanical assembly of dewar during measurements. 	<p>correct the dead volume (free space) change in sample cell due to change in liquid nitrogen (LN2) levels due to evaporation, change in atmospheric pressure, and change in LN2 temperature.</p> <ul style="list-style-type: none"> • Compensation for the dead volume changes should be made continuously during the measurement. • The system should avoid any moving electromechanical assembly of dewar during measurements.
12	<ul style="list-style-type: none"> • Includes necessary accessories for gas and vapor adsorption measurement from 10°C to 70°C with isolation valve, heating mantle Reference material and other supports. 	<ul style="list-style-type: none"> • Includes necessary accessories for gas and vapor adsorption measurement from -10°C to 70°C with isolation valve, heating mantle Reference material and other supports.
15	<ul style="list-style-type: none"> • The instrument should be supplied with a degassing unit and should be capable of degassing minimum 6 samples simultaneously under vacuum and using purge flow. • Degassing temperature control should be up to 400°C or better. • The degassing system must have an independent vacuum pump and should not share vacuum connections with the main analyzer. • In situ degassing should be available with the analysis unit. 	<ul style="list-style-type: none"> • The instrument should be supplied with a degassing unit and should be capable of degassing minimum 6 samples simultaneously under vacuum and using purge flow. • Degassing temperature control should be up to 400°C or better. • The degassing system must have an independent vacuum pump and should not share vacuum connections with the main analyzer. • The In-situ degassing should be in addition to the external degaussing system, this is required for extremely low-pressure measurements and to remove contamination during sample tube changeover from degaussing port to analysis port. The in-situ heater should be able to heat samples 50°C to 400°C or more for in all the ports.
17	<ul style="list-style-type: none"> • The system should be equipped with at least 12 gas inlet ports. • Furnace should be able to be operated up to 1100°C with programmable rate of 0.1 to 50°C/min. • Should be equipped with a mass flow controller with flow up to 200 cm³/min (min 50 cm³/min) 	<p>Please delete this section</p>
19	<ul style="list-style-type: none"> • Python programming feature should be available for creation of user defined reports. 	<ul style="list-style-type: none"> • Adequate feature should be available for creation of user defined reports.
26	<ul style="list-style-type: none"> • Gas Cylinder with at least 46-liter capacity, equipped dual stage, 	<ul style="list-style-type: none"> • Gas Cylinder with at least 46-liter capacity, equipped dual stage, high

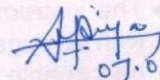
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<p>high quality regulator, stainless steel diaphragm, 0 - 30 psi delivery pressure, isolation valve, and required fittings (N₂, CO₂, He, Ar, Kr, Zero Air). Pneumatic operation air cylinder/compressor should be provided.</p>	<p>quality regulator, stainless steel diaphragm, 0 - 30 psi delivery pressure, isolation valve, and required fittings (N₂, CO₂, He, Ar, Kr, Zero Air). For Kr, Gas Cylinder with at least 10-liter capacity. Pneumatic operation air cylinder/compressor should be provided.</p>
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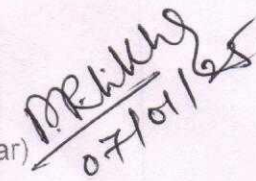
All the other tender terms remains unchanged. Bidders may please submit their bids accordingly.

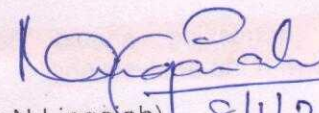

 (Dr. Pratyay Basak)
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 Member


 (Dr. Pravin Likhar)
 IO/Co-PI


 (Dr. N Lingarah)
 Chairperson

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ANNEXURE-1

REVISED TECHNICAL SPECIFICATIONS OF VOLUMETRIC ADSORPTION FACILITY/ANALYZER REVISED TITLE OF EQUIPMENT: High Precision Extremely Low Pressure Gas Sorption Analyzer

Sl. No	Features	Specifications
1	Analyzer	<ul style="list-style-type: none"> • Suitable for measurement of surface area, pore size distribution, and adsorption isotherms of various gases at variable temperatures. • The system should be automatic and capable of carrying out physisorption of various gases and should have features to measure the adsorption / desorption isotherms, surface area, pore size distribution of Microporous, Mesopores and Macro porous materials. • System should be equipped with Vapor option for vapor sorption studies minimum on 2 or more ports. • The system should handle all types of samples in powder, pellet & monolith forms.
2	Measurement Principle	<ul style="list-style-type: none"> • Volumetric gas adsorption technique
3	Analyzer Capability	<ul style="list-style-type: none"> • Gas sorption isotherm, BET specific surface area I type (ISO 9277), BET automatic analysis, Langmuir specific surface area, BJH, DH, HK method, t-plot, differential adsorption isotherm, NLDFT / GCMC models, etc.
4	Ports for simultaneous analysis.	<ul style="list-style-type: none"> • Simultaneous and parallel analysis with 3 or more analysis ports. All 3 ports should be capable of measuring micropore, mesopore, etc. The system should be suitable for measuring adsorption isotherms of different gases (N₂, CO₂, O₂, H₂, CH₄, etc.) at different temperatures (-10°C – 70°C). • Suitable chillers should be provided to maintain temperature in the above range. • All these ports should be suitable for micropore analysis and be equipped with 1000 Torr, 10 Torr and 0.1 Torr sensors.
5	Adsorptive Gases	<ul style="list-style-type: none"> • Should be compatible with N₂, Ar, Kr, CO₂, H₂, O₂, CH₄, NH₃, butane, and other non-corrosive gases
6	Port for Saturation vapor pressure	<ul style="list-style-type: none"> • System should have a dedicated port with its own pressure sensor to measure saturation vapor pressure, the material should be designed for durability and long life.
7	Gas inlet ports	<ul style="list-style-type: none"> • Gas ports for 5 or more gas inlet connections with manual or automatic port selection through software.
8	Measurement range	<ul style="list-style-type: none"> • Surface area: 0.01 m²/g and above with (N₂, Ar) and 0.0005 m²/g and above with (Kr) • Pore Diameter Range: 0.35- 500 nm or better • Low pressure isotherm starting from P/Po = 10⁻⁹ to 0.997
9	Pressure Transducers and Accuracy	<ul style="list-style-type: none"> • 133 kPa (1000 Torr) ±0.12% of F.S. x 5 units or more • 1.33 kPa (10 Torr) ±0.12% of Readings. x 4 units or more • 0.0133 kPa (0.1 Torr) ±0.15% of Readings. x 3 unit or more
10	High Vacuum system	<ul style="list-style-type: none"> • Analyzer should have a Turbo molecular pump (TMP) for ultra-high vacuum coupled with a backing pump.

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11	Dead volume correction.	<ul style="list-style-type: none"> System should have provision to correct the dead volume (free space) change in sample cell due to change in liquid nitrogen (LN2) levels due to evaporation, change in atmospheric pressure, and change in LN2 temperature. Compensation for the dead volume changes should be made continuously during the measurement. The system should avoid any moving electromechanical assembly of dewar during measurements.
12	Vapor Source Option	<ul style="list-style-type: none"> Includes necessary accessories for gas and vapor adsorption measurement from -10°C to 70°C with isolation valve, heating mantle Reference material and other supports.
13	Chiller Dewar Option Kit	<ul style="list-style-type: none"> Permits connection of a recirculating bath to a modified cryogen Dewar in order to control analyses at a variety of temperatures.
14	Gas Dosing Optimization	<ul style="list-style-type: none"> Instrument should be equipped with servo-controlled valves for dosing and evacuation for faster measurements.
15	Sample Pre-treatment	<ul style="list-style-type: none"> The instrument should be supplied with a degassing unit and should be capable of degassing minimum 6 samples simultaneously under vacuum and using purge flow. Degassing temperature control should be up to 400°C or better. The degassing system must have an independent vacuum pump and should not share vacuum connections with the main analyzer. The In-situ degassing should be in addition to the external degaussing system, this is required for extremely low-pressure measurements and to remove contamination during sample tube changeover from degaussing port to analysis port. The in-situ heater should be able to heat samples 50°C to 400°C or more for in all the ports.
16	Cryo cooling	<ul style="list-style-type: none"> Dewar vessel of capacity: 3 L or more, with LN₂, holding time: 70 hours or more for long measurements
17	Software for instrument control	<ul style="list-style-type: none"> The control software should be original licensed copy software. It should display instrument status, trend chart and real time isotherm parallel for all samples during measurement. The required analysis software for measured data should be provided. The software should have data handling features like user defined report generation, data/ figures export to spread sheets (ASCII files import/ export, word/ excel compatibility, pdf formats) and offline data processing etc. Software should have option to check the health of the instrument by User.
18	Software for Analysis / measurement	<ul style="list-style-type: none"> Software should be capable of calculating specific surface area by Langmuir and BET equations. Software should have the provision to measure the pore volume, pore area for mesoporous samples based on BJH, DH, etc. Software should have the provision to calculate the Pore specific surface area based on Adsorption/Desorption. t plot, α_s plot, MP method should be available for the evaluation of Microporous samples. Pore size and distribution for microporous materials Software for differential adsorption isotherm, NLDFT/GCMC models, Dubinin-Astakhov method should be included. Dual NLDFT feature for calculation feature for calculation of pore size distribution for the data collected with different adsorbent.

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		<ul style="list-style-type: none"> • User should be able to create reference isotherms for t-curve and αs curve. • Different standard t curve data (at least five standard curves) should be available for data evaluation. • Features like isotherm overlay, BET plot overlay, differential isotherm should be available. • Analysis software for measured data should be provided and must be able to overlay more than 20 data files with a feature of file add and subtract feature. • The software should have data handling features like user defined report generation, data/ figures export to spread sheets (ASCII files import/ export, word/excel compatibility, pdf formats) and offline data processing etc. • Adequate feature should be available for creation of user defined reports. • Additional 10 licenses for data analysis software in addition to instrument computer should be provided. • Regular up-gradation of software has to be provided for at least 8-10 years.
19	Essential Accessories	<ul style="list-style-type: none"> • System should be supplied with appropriate Sample cells and should have provision to prevent powder elutriation. • Surface area and pore size reference material should be supplied. One each for low surface area, high surface area, microporous and mesoporous material. • One set of manual and service manual (both hard and soft copy in English) should be supplied with the equipment. • Suitable UPS with a minimum 30-minute backup should be provided.
20	Training	<ul style="list-style-type: none"> • The manufacturer / supplier of instrument should provide five days onsite training in both hardware and software to the laboratory personnel in the installation, operation, and maintenance of the instruments. • Regular follow up training every six months during warranty period on mutually convenient dates for hardware, software, and application to the laboratory personnel in the installation, operation and maintenance of the instruments
21	Warranty	<ul style="list-style-type: none"> • The system should be covered with a comprehensive warranty for 1 year from the date of successful installation. All parts, including spares, should be covered under the warranty and this fact should be clearly and explicitly specified in the tender document. • The comprehensive Warranty should cover: <ul style="list-style-type: none"> • All parts including accessories, spares, and labor on site • Free maintenance and service on-site or at the factory with no cost. • Regular up-gradation of software • 3 year extended warranty with scheduled service
22	Computer & Printer	<p>A suitable branded computer for system control & data acquisition and color laser Printer should be supplied.</p> <ul style="list-style-type: none"> • The computer should contain Intel Core i5 (latest generation), 1TB SSD, 16GB of RAM or more, WIN11 PRO, NVIDIA GT 730 Graphics Card, integrated with Web cam, mic, speakers, keyboard, mouse, Wireless enable and Ethernet, HDMI, VGA, and other relevant ports. • Monitor: 24" monitor with Full HD Display along with HDMI and VGA, and other relevant ports.
23	Vacuum pumps	System should be supplied with required turbo vacuum pumps for analyzer and a separate vacuum pump for degassing system.
24	Liquid Nitrogen container	1 Nos. of 10L Liquid nitrogen container with liquid nitrogen transfer device should be supplied

M. Richards

25	Gas Cylinder and Pressure Regulator Assembly	Gas Cylinder with at least 46-liter capacity, equipped dual stage, high quality regulator, stainless steel diaphragm, 0 - 30 psi delivery pressure, isolation valve, and required fittings (N ₂ , CO ₂ , He, Ar, Zero Air). For Kr, Gas Cylinder with at least 10-liter capacity. Pneumatic operation air cylinder/compressor should be provided.
26	Gas Control Panel for above cylinders with lining and plumbing	Gas Control Panel with gas line plumbing and inline filters with cylinder manifold, Cylinder Holding & Mounting Bracket with Chains, SS Braided High Pressure Pigtails with Safety Rope, tubing, Aluminium Powder Coated Casing and necessary fittings for above cylinders.

Drakes

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