

Item: Porosimeter / BET surface area analyzer

Qty: 01 unit

Quotations are invited for the procurement of a fully automatic, high resolution Porosimeter / BET surface area analyzer instrument with below mentioned technical specifications on C.I.P. Jaipur/Delhi basis (by Air Freight only). The quotation should mention the terms of delivery, delivery schedule, estimated delivery date, and payment terms. The tender should be submitted in two separate sealed envelopes: one containing the technical bid and the other containing the commercial bid.

The state-of-the-art Porosimeter / Brunauer-Emmett-Teller (BET) surface area analyzer to be procured will be a part of the central characterization facility. Therefore, the instrument should be fully automatic, multi-user friendly with an easy-to-use software interface, modular hardware design that allows for easy to change from one measurement mode to another. The high throughput instrument equipped with both the gas and vapour adsorption facility is required for the determination surface area, mesopore size and micropore distributions from 0.35 to 500nm. The system should handle all types of samples like powder, pellet & monolith forms. The system should also be capable of upgrading for addition of Physisorption stations and for performing complete Chemisorption analysis along with Pulse Chemisorption in the same system at a later date on site.

The Instrument is expected to have continuous P_0 measurement using a dedicated glass cell and transducer without interruption to the analysis. The instrument should have a fully integrated, built-in/external vacuum system using an oil-free turbo pump package. The Instrument should include four or more dedicated degassing stations with access to turbo vacuum via cold-trap. The Instrument should be able to use any non-corrosive gas such as nitrogen, argon, krypton, carbon dioxide, hydrogen, etc. *as well as vapour (e.g. H₂O, MeOH, EtOH, C₆H₆, etc.) adsorption with high precision under variable temperature.* The system should have two physisorption analysis stations. Both the physisorption ports should work simultaneously and independently with independent manifolds. One should be fitted with a set of transducers (1000 torr, 10 torr & 0.1 torr) and the other with 1000 torr transducer.

The Instrument should have the following Measurement criteria:

The system being quoted should have the ability to measure Surface Area by single and multi point BET, DR micro pore and mesopore volume/ surface area, Surface Area by Single and multi point Langmuir, Total pore volume, Total micro pore volume and area by T-Plot method. Analysis log, Horvath-Kawazoe data reduction, BJH pore size distribution using adsorption and desorption isotherm with the highest level of accuracy.

The system should have the suitable software with user interactive data analysis tools. The software should be an original licensed copy software with specific part number mentioned in

the offer with integrated database. No pirated version of the software will be allowed and if found the offer will be strictly rejected. Periodical updates of the software should be provided free of cost for a period of five years. The data analysis software should be multi-user licensed, to allow installation at minimum 2 PCs.

The software should have the 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.

The Instrument should have following basic measurement specifications:

- a) Surface area using nitrogen: 0.01 m²/g and above
- b) Sensitivity: 2×10^{-9} moles adsorbed/desorbed gas with 0.1 torr transducer
- c) Maximum P/Po using nitrogen/argon: 0.999
- d) Ultimate vacuum: 5x10⁻¹⁰ mbar

The Instrument should have Following Analysis Features:

- I. A High-vacuum construction using metal-to-metal seals is expected for long life performance.
- II. The system should have the smallest void volume.
- III. The Instrument should use low cold zone technology to enhance sensitivity such that all of cell stem is not cooled.
- IV. The System should constantly monitor measurement of manifold temperature and pressure.
- V. The system should have multiple dosing modes using a target P/Po or fixed volumes in multiple ranges.
- VI. A dosing intelligence feature to use prior analysis as template for dosing in subsequent runs.
- VII. The Instrument should measure void volume automatically or re-use value already measured.
- VIII. The saturation pressure should be constantly measured, or user entered.
- IX. The system should have at least 3 liter or larger Dewar to extend uninterrupted analysis time to 90+ hours without refill.
- X. The system should have automatic selection of analysis gas from five inputs.
- XI. *The instrument being quoted should have the ability provision to correct the dead volume Change without any need to maintain the liquid nitrogen level or with better mechanism.*

The Instrument should have following sample degassing features:

- i. The system should degas *three* or more sample simultaneously.

- ii. The degassing should be able to program multiple heating ramps and hold times.
- iii. The system should have programmable evacuation to avoid elutriation.
- iv. The system should have smart degassing to monitor pressure and pause heating if requested.
- v. The smart degassing should be able to automatically terminate heating according to programmable test.
- vi. The system should automatically backfill from dedicated gas input or isolate under vacuum at end of degassing.
- vii. The Degassing protocols should be able to be saved for later use.
- viii. The Degassing protocols should be able to be stored along with analysis data.
- ix. The Vacuum path should have refillable cold trap for best degas vacuum levels.
- x. The Heating mantles should have dual, independent thermocouples for over-temperature safety.
- xi. The Heating mantles should be supported by retractable tethers to eliminate hot metal clips for ease of use.
- xii. The Heating mantle temperature should go upto 350° C.

Accessories to be supplied along with the system:

1. Suitable standards for micropore & mesopore range should be quoted.
2. Gas cylinders must be 99.999% Ultra High Purity with two stage gas regulators. Nitrogen, Helium gas should be supplied. Connectors, PTFE/SS gas tube, nuts, ferrules, tubes, must be supplied and those have to be connected and integrated with the main unit.
3. A liquid Nitrogen Cryocan of 10 liters or more capacity should be offered with the instrument by the vendor.
4. Compatible desktop computer (minimum i5 configuration)
5. Sample cells (in capacities 6mm, 9mm, 12mm): 5 each for powders, pellets, and granules. Sample holder for fine powders should have the provision to vacuum seal.
6. Physisorption operating supplies Kit: Physisorption operating supplies Kit including ferrules, O-rings, jackets, gaskets, maintenance parts should be supplied. "O" rings & filler rods (5 sets).

Terms and Condition

1. The complete system should be compatible to 200-240 V, 50Hz, single phase power supply.
2. Comprehensive warranty with all the consumable and spare parts should be offered with 3 years warranty. This includes replacement of damaged parts and engineering/service support at the cost of the supplier. In case, the machine is down for more than 1 week during the warranty period, number of days accordingly should be compensated by providing additional extended warranty free of cost.

3. The vendor must quote for a non-comprehensive AMC price beyond the 3-year warranty, with a price lock in for 3 years beyond the standard 3-year warranty period, 2/3 services per year should be included in the AMC. Annual Maintenance Contract should be clearly mentioned after warranty period.
4. Vendor should provide installation details of at least 10 similar installations in India.
5. The vendor should have a well-established application laboratory in India to support us for applications, method developments, training etc.
6. The price quotation should include the cost of installation and training of potential users.
7. the quoted accuracy as per the technical specification should be demonstrated at the time of installation of the equipment.
8. One set of manual and service manual (both hard and soft copy in English) should be supplied with the equipment.
9. The vendor should have qualified technical service personnel for the equipment based in India and should assure a response time of <48 hours.
10. Complete technical details of pre-installation requirements should be furnished along with the technical bid.
11. *Bid should include all other essential auxiliary equipment and spares for its operation, even which are not explicitly specified above (please provide list with details). Please provide the segmented quotation for each optional measurement capabilities. Depending upon the budgetary provision and priority, the items to be purchased will be decided.*
12. *The vendor must provide a compliance statement in a tabular form concerning each technical specification in the tender document duly supported by the manufacturer's literature and published papers. Technical bids without supporting data will be deemed as technically non-compliant.*
13. The indenter reserves the right to withhold placement of final order. The right to reject all or any of the quotations and to split up the requirements or relax any or all of the above conditions without assigning any reason is reserved.
14. REASONABILITY OF PRICE: Price quoted shall be the best competitive/minimum price applicable for a Educational and Research Institution. The bidder may be required to give details of at least two purchase orders identical or similar equipment, supplied to any IIT's/Research Institutions/ other organizations as and when required along with the final price paid and details.