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TENDER NO. CBS/CA019 - 063/PUB

December 10, 2019

Notice Inviting Tender (Two Part Tender) for the following item:

Sr. No.	Item Description	Qty
1	FT-NMR Spectrometer (400 MHz) (Details as per attached specifications)	01 Set

Published on	11/12/2019
Type of Tender	Two Part Limited Tender
Estimated Cost	Rs.300/-Lakh (approx.)
Last date for Submission of Bid	17/01/2020 on or before 13.00 hours
Date of Opening Bids	17/01/2020 at 14.00 hours
Tender Fees	Rs.500/- by DD favoring UM-DAE CBS

Tender should be submitted in One sealed envelope enclosing both Technical and Commercial Bids duly superscribed with the Tender No., Due Date in Bold Letters addressed to Registrar CEBS . A DD of Rs. 500/- favoring **UM-DAE CBS** may be enclosed in the "Technical Bid".

Please refer to "Terms and Conditions"


(REGISTRAR)

Technical Specification for 400 MHz FT-NMR Spectrometer

Magnet:

1. Latest technology based stable and actively shielded superconducting magnet (9.4 Tesla) with an operational frequency of 400 MHz for ^1H .
2. Shortest possible 5 Gauss (radial from the center of the magnet 0.5 m or less, and axial from the center of the magnet 1.0 m or less) fringe field with advanced shielding technology.
3. Magnet should be standard room temperature bore.
4. Expected field drift 4 Hz/hr or less.
5. Liquid helium hold time should be minimum 300 days and also provide Liquid Helium transfer line with accessories
6. Liquid nitrogen hold time should be minimum 14 days and also provide Liquid Nitrogen transfer line with accessories
7. Minimum five cryo shims
8. Minimum of 26 room-temperature shim coils for best possible resolution.
9. Anti-vibration feet pad for dampening the low frequency floor vibrations (Should be capable of damping the vibrations as low as 4 Hz or less).
10. Digital level meters for both liquid Nitrogen and liquid Helium.
11. Standard test samples

Spectrometer Console:

1. Minimum 2 channel architecture, possibility to add third channel in future.
2. Advanced feature based two broadband frequency generation independent RF channels (full frequency range generation) with highest frequency and phase resolution; fast switching time for all parameters, without any hidden delays along with its importance in the quality of the spectra. It should include wave form generators for pulse shaping, amplitude, phase and composite pulse decoupling generator, preamplifiers with standard filters and digital receiver control with oversampling and quadrature detection with digitizer's facility for complete elimination of quadrature spikes.
3. Digital lock channel. Lock system with high precision phase- and field-correction, corrections for short-term disturbances (documental evidence is required).
4. Advanced Detection with Digital Receiver. Over-sampling and on-line digital filtering along with complete elimination of the quadrature images/spikes, artifacts in the center of the NMR spectrum (documental evidence is required).
5. Two high performance linear amplifiers: For observation or decoupling of ^1H or ^{19}F . 100 W or more pulse power for ^1H and 500 W or more pulse power for ^{19}F , ^{31}P - ^{109}Ag .
6. Single and Dual receiver capability with digital receiver for simultaneous acquisition, filtering, sampling.
7. Preamplifiers: Multinuclear preamplifier, ^2H preamplifier for lock and ^2H experiments, Built-in tune/match display, Add-on filters for noise reduction

8. Gradient system for Z-pulsed field gradient (PFG) with a gradient strength of up to 50 G/cm or more for gradient NMR experiments in solution. PFG of any desired shape and gradient shimming capabilities.
9. Low- and high-temperature accessories. Variable temperature unit include:
 - a. Controller should be for long term temperature stability at both high and low ranges.
 - b. High temperature range: Ambient to +150 °C.
 - c. Nitrogen cooling system range: Ambient to -150 °C. Temperature resolution $\leq 0.1^\circ\text{C}$.

Low temperature accessory:

- (a) Low temperature unit should include suitable liquid nitrogen Dewar, evaporator and transfer line.
- (b) Low temperature limit: - 150 °C

The low temperature unit should be complete in all respects. This unit should be controlled through host computer for setting of temperature, heating/cooling rate, air flow rate.

Probes: We are looking for broadband inverse detection probe.

- (a) 5 mm variable temperature broadband inverse detection probe for observation of $^{19}\text{F}\{^1\text{H}\}$, $^1\text{H}\{^{19}\text{F}\}$, ^1H and X nuclei (^{31}P to ^{109}Ag).
- (b) X (broadband) detection (^{31}P to ^{109}Ag)
- (c) Sample tube diameter: 5 mm
- (d) Variable temperature operation: -150°C to $+150^\circ\text{C}$.
- (e) Built in Z-Gradient coil for PFG
- (f) Digital lock
- (g) Automatic tuning and matching.

Required performances:

a. Signal to noise ratio:

S. No	Nuclei	Signal to noise ratio	Standard sample name
1	^1H	> 500:1	0.1 % EB (ethylbenzene)
2	^{13}C	> 200:1	10 % EB (ethylbenzene)
3	^{31}P	> 150:1	TPP (Thiamine pyrophosphate)
4	^{15}N	> 20:1	90% Formamide

b. Pulse widths

S. No	Nuclei	Pulse widths
1	^1H	< 12 μs
2	^{13}C	< 12 μs
3	^{31}P	< 12 μs
4	^{15}N	< 25 μs

c. Line shape

S. No	Nucleus	Full-width at Half Maximum (FWHM), non-spinning	Line-width at 0.55 % peak height, non-spinning	Line-width at 0.11 % peak height, non-spinning	Standard sample name
1	^1H	< 1.0 Hz	< 8.0 Hz	< 15.0 Hz	1 % CHCl_3
2	^{13}C	< 0.6 Hz	< 4.0 Hz	< 8.0 Hz	1 % CHCl_3

User Interface:

1. High performance state-of-the-art workstation (Windows operating system) for acquisition and processing that can be easily serviced in India:
24" LCD/TFT monitor, one terabyte Hard Disk, 3 GHz Processor, 8 GB RAM.
CD-DVD read-write drives, USB Ports, High performance printer (laser color printer)
 - Licensed Software Modules include:
 - a) Acquisition, Processing, Plotting, Structure Verification and Analysis-1D and 2D (HSQC, TOCSY, COSY, HETCOR, NOESY, HMBC, DOSY etc.), Experiment Simulation, Spectra Simulation, Multiplet Analysis, Teaching Software, Deconvolution, Automation, Projection Reconstruction Spectroscopy, and Non-uniform sampling.
 - b) Acquisition and processing of dual-receiver and Hadamard NMR experiments.
 - c) The vendor should provide two floating licenses along with one processing PC (with latest configuration).
 - d) Licensed software for statistical Chemometric Principal Component Analysis (PCA) of the NMR data, multivariate analysis and spectroscopic analysis for body fluids, tissues etc.
 - e) NMR software with the instrument.
 - f) A complete set of operational manuals should be provided.

All required hardware and software documents, manuals, installation CDs/DVDs to be provided.

Accessories:

1. 4 containers of 55 liters capacity along with liquid Nitrogen transfer line required for regular filling of liquid Nitrogen in the cryomagnet.
2. One trolley for transporting 55 liters Cryocans.
3. 4 Sample spinners/holder for 5 mm NMR tubes
4. 250 NMR tubes with caps, suitable for low and/or high temperature experiments.
5. Essential spare parts for magnet/Spectrometer
6. An ISO-9001 certified imported oil-free scroll air-compressor complete with dryer with proper ratings and specification capable of catering all the needs, with a sufficiently big buffer tank along with the system.

Power backup:

A suitable ISO-9001 certified Indian-make online UPS (10 KVA) for the whole system with a minimum backup of 1 hour.

Installation:

Installation and commissioning to be carried out by the supplier at our site. The equipment will be deemed acceptable after demonstration by recording a few standard and unknown samples of various nuclei and methods. The liquid nitrogen and helium required for installation should be provided by the NMR supplier at their expense. The vendor must also top up the helium level to 100% after the magnet charging.

Supply and refilling contract of liquid Helium for 5 years from the date of installation.

Warranty:

Comprehensive on-site warranty for additional two years after completion of standard one-year warranty including:

- (a) All parts including accessories and labor
- (b) Free maintenance and service
- (c) Regular upgrades to all software during the entire warranty period
- (d) Vendor should provide a certificate that they will provide the spares in future for at least for ten years.

Optional Items:

1. AMC for 5 years after the expiry of standard 3 years warranty.

Training:

1. Comprehensive training for one person at your factory and initial on-site training of the staff, update every six months for the first two years and every year for the next three years.
2. On-site training should also be provided to our staff after installation.

Future capabilities:

The quoted instrument must have the following capabilities/compatibility for any future

