

NATIONAL INSTITUTE OF PLANT GENOME RESEARCH
(An Autonomous Research Institution of the Department of Biotechnology
Ministry of Science and Technology, Govt. of India)
Aruna Asaf Ali Marg, New Delhi – 110 067
Phone: 26735139, 26735141 Fax: 26741658, 26741146

CORRIGENDUM

This has reference to our Tender No. 8/I/NIPGR/S&P/2018-19 towards supply and installation of **LC-ICPMS system**. In this context, this is to mention that the dates for submission/opening of Tenders have been revised and extended upto **9/8/2018** (3.00 P.M/3.30 P.M respectively). Placed below are the revised specifications, however, all other terms and conditions of the tender remain unchanged.

Specifications:

ICP-MS system is required for elemental analysis of **plant, soil and other agricultural products**. Instrument should be capable to analyzing high matrix samples with very low sample quantity (e.g 200ul-500ul) with high sensitivity. The instrument must comply with the guidelines of international Standards and Regulatory Agencies. The instrument must be sensitive enough to detect at sub ppb (parts per billion) levels in the mixture of fluids having high concentrations of other elements (should be able to analyze all the elements including Na, K & Ca in single run. The instrument should be low on maintenance and operational cost. For a complete solution module with the following specifications need to be provided:

Instrument Hardware: Should be a Bench top system:

- (A). The instrument must have a frequency matching RF Generator, operating at 27MHz-40MHz, from 400 to 1600 or better watts and should be software controlled.
- (B). The torch ignition, shut down and system warm up should be auto-controlled.
- (C). Plasma Torch to spectrometer alignment in XYZ direction. Torch position resolution and reproducibility should not be higher than 0.1 mm in all three axes.
- (D). Plasma gas flow should be controlled by an active mass flow controller for all gas control of Plasma gas, auxiliary gas and nebulizer gas.
- (E). Water recirculation chiller for ICP system as standard accessory-1 from Original Equipment Manufacturer.

2 Lens/cones system for focusing the ions:

- (A). To reduce routine maintenance when analyzing high matrix samples, the collision/reaction cell must be protected from contamination by off-axis ion lens/cones or suitable technology.

(B). To minimize downtime due to routine maintenance and to protect the mass analyzer and detector from contamination with atmospheric moisture, the main ion lens assembly (i.e. off-axis lens) or cones should be located outside the high vacuum region (i.e. in front of the gate valve) to allow for removal, cleaning and replacement without the need to vent the main vacuum system.

3. Collision/reaction cell technology to remove polyatomic interference:

(A). The system should contain collision/reaction cell.

(B). The collision/reaction cell must operate effectively in collision mode, using pure Helium Gas. There should be future upgradable option for using NH₃/O₂ and H₂ or any other gas in reaction mode with suitable mass flow controller and separate/additional gas line at site. In the specification or technical data sheet it should be clearly mentioned the provision of 3 cell gas line.

4. Mass Analyzer:

(A). It should be a quadrupole based and should operate at min 2.0 -3.0 MHz frequency.

(B). The analyzer quadrupole should discretely control the resolution of the selected mass region dynamically without affecting the overall nominal resolution of the system.

(C) The entire mass range should be minimum 7 to 230 or better amu.

5. Sensitivity:

(A)Low Mass: ≥ 15 Mcps/ppm

(B) Mid Mass: ≥ 150 Mcps/ppm

(C)High Mass: ≥ 100 Mcps/ppm

6. Detection Limit:

(A)Low Mass: 0.1 - 0.5ppt

(B) Mid Mass: < 0.1 ppt

(C)High Mass: < 0.1 ppt

7. Ion Detection Assembly:

The ion detector should be a discrete Dynode electron multiplier unit or equivalent. Detector should be able to analyze high and low concentration of isotopes simultaneously with min 9 or more orders of dynamic range in a single scan.

8. Extraction Interface:

(A). Ni Sample cones, Skimmer Cones or any other cones as applicable.

(B). Cones should be easily mountable and dismountable.

(C). The offered skimmer and sampler cones should be capable of analyzing both high matrix and high sensitive samples under routine condition in single run.

9. Sample introduction System: Standard single piece quartz injector torch with optimum diameter for matrix decomposition and sample ionization.

10. Nebulizers:

It must include a glass/quartz nebulizer as standard.

11. Spray chamber:

Temperature controlled spray chamber with efficient peltier cooling (min -5°C to + 20 °C) device to prevent signal drift caused by large changes in room temperature and also to reduce solvent loading on the plasma so that a higher plasma temperature can be achieved reducing oxide interferences and assisting in matrix decomposition.

12. Performance:

The instrument should be capable of giving sub ppb and ppt level detection of the below listed elements in sample/matrix. Pb, Cd, As, Hg, Cu, Zn, Al, Fe, Se, Na, K, Cr, Ni, P, Ca, Mg, Mn, Co, Ba,Cs, Ag etc. Instrument should have offered with suitable inbuilt/externally built software controlled online argon dilution facility to reduce matrix effect of agricultural samples containing Na/K/Ca approx. 25000ppm. The oxide ratio should be <2 % while using high TDS samples. High TDS greater than 2.5% with variable dilution factor applicability should be offered. Min 15 fold dilution capability should be there in the system. No manual argon dilution accessory or facility will be acceptable.

13. Environmental Factors:

Temperature: 15 to 30°C at constant temperature (variations < 3 °C from calibration temperature), Humidity: 20 to 80%.

14. Upgrade path:

System should be compatible to be upgraded with LC-ICP-MS operation for speciation studies, GC-ICP-MS operation etc.

15. LC-ICP-MS Interface:

- An integrated LC-ICP-MS interface to be provided which should include quaternary pump, degasser, flow cells, column heater, detector, speciation column for **chromium, mercury and arsenic** with all required accessories. The system must have automatic switch valve to transfer column elution from column outlet to ICP-MS without any manual intervention. The full configuration of HPLC-ICP-MS and transfer valve must be under one **single software control**. The speciation studies should be demonstrated during installation of the instrument at laboratory. Speciation standard for As, Cr, & Hg should be offered.

Specification for Ultra High Performance Liquid Chromatography (UHPLC) System

Pump. 1 No.

- Quaternary gradient Pump must be able to mix upto 4 solvents.
- The Flow rate 0.01 to 5 mL/min in 0.001 mL/min increments or better
- Flow rate accuracy: $\pm 1\%$
- Flow rate Precision: $\pm 0.07\%$ RSD
- Maximum Pressure Setting range: 18000 psi or higher
- Pump Seal Wash & Wet Prime should be Automatic
- Default Total System Dwell Volume: $\leq 400\ \mu\text{L}$
- System should withstand pH range of 1 to 12
- Safety Feature: Leak Sensors & safe leak handling feature
- Online membrane degassing unit must be present.

Detector: PDA/DAD

- Wavelength Range: 190-640 nm or better
- Diode elements must be 512 or higher
- Flow Cell Volume: $< 2.5\ \mu\text{L}$ or better
- Flow Cell Path Length: 10 mm or higher
- Wavelength Accuracy: $\pm 1\text{nm}$
- Linearity Should be: $> 1.5\ \text{AU}$ or better
- Base line noise should be: $< 10 \times 10^{-6}\ \text{Au}$ at 230 nm
- Drift: $\leq 1.0 \times 10^{-3}\ \text{AU/Hr/}^\circ\text{C}$
- Detector should be able to capture: > 4 signals at different wavelengths.

Auto Sampler with Thermostat

- Sampler injection Volume setting range: 0.1 to 20 μL .
- It should be able to maintain temperature between: 4°C to 40°C

- The Carry over must be below: <0.005%
- Injection precision: < 1.0% of RSD
- Must be able to withstand backpressure up to: 18000psi.
- Injection cycle time: <22s
- Injection Needle Wash: Should be Programmable, Integrated and Active
- Sampler must include trays as appropriate capable holding more than 90x2mL vials and 96 well plate micro titre.
- Advanced Features like in-needle derivatization for amino acid analysis must be present.

Column Oven with thermostat

- The temperature range should be 10°C below ambient to 80°C or better
- Temperature control stability: ± 0.3 °C
- Must be able to accommodate columns of 2x300mm length and 4.6mm ID.

Amino acids analysis kit

- Amino acid analysis kit must contain derivatization reagents, amino acid standard and column.

Columns:

- C – 18 Column: 50mm Length, 2.1 mm id, particle size <2.0 μm - 2 nos with guard column of the same chemistry.
- C – 18 Column: 100mm Length, 4.6 mm id, particle size <3.0 μm - 2 nos with guard column of the same chemistry.
- C-18 Column: 100mm Length, 2.1 mm id, particle size <2.0 μm - 2 nos with guard column of the same chemistry.
- C-18 Column: 150 mm Length, 4.6 mm id, particle size 5 μm - 1 nos with guard column of the same chemistry.
- C18 column (250mm Length, 3 4.6 mm id, 5mm particle size) with guard column of the same chemistry
- C₃₀ carotenoid column (250 X 4.6 mmid, 5 μm particle size)-1 nos with guard column of the same chemistry
- Carbohydrate and sugar column pH range 2-11 or better with suitable guard column 1 nos with guard column of the same chemistry.

Software

- Operation of the system should be very easy
- Single point control of complete system.
- Software for control of complete LC system with detectors to acquire and processing of data for standalone LC operation. Software for speciation studies also to quote.
- Pre-made templates, customizable data reports, online help and answer wizard, report publisher.

16. ICP-MS Autosampler:

- The system shall include a fully automated random access auto sampler capable of holding min 200 vials. A 96 well plate micro titre plate kit with accessories is to be quoted along with system. The system should be future upgradable to hold samples more than 300 at any point of time.

17. Branded OEM/compatible workstation with laser printer and UPS should be provided with the instrument with all the pre-loaded software required for all the functions of equipment's- 2 nos

One PC should have following minimum specification or better (PC 27" monitor, iCore7, 32 GB RAM, 1 TB HDD, Latest and compatible operating system which can be upgradable at no extra cost).

18. Essential Accessories:

a. Installation Utilities: Multi-element standard — 1 No NIST traceable min 200ml with two years shelf life

b. Fume exhaust for ICP system - 01 set c. Gas supply system to ICP system - 01 set. D. The gas supply system is meant to provide required gases to the ICP system at specific purity (99.999%), pressure and flow rates. Such a gas supply system should include: 1. Gas cylinders for Plasma formation - Argon (4 nos) 2. Gas cylinder for Collision cell gases — Helium (1 no) 3. 2 stage Gas pressure regulators (Stainless steel), -2 nos 4. Gas purification panels. 5. Gas supply manifold for switching Ar gas cylinder 6. Stainless Steel tubing, 7. gas trolley 8. 20KVA online UPS system with minimum 30mts battery backup (for instrument and computer)

19 The following consumables must be quoted separately.

- A. Rotary Pump Oil 5 packets.
- B. Plasma Torch – 5 nos
- C. Nebulizer – 5 Nos
- D. Spray chamber 5 Nos
- E. Ni Sample & skimmer cones 4 Nos each.
- F. Tubings for sample introduction, drain and internal standard: min 36 Nos each.
- G. The list of essential consumables of the LC to be quoted.

Other than standard consumable and consumable listed please quote a consolidated list of consumables for 5 year with approx. 150 samples/week.

20. The instrument should be certified by USFDA/CE (Europe)/IVD USA

21. 5 Year comprehensive warranty should be provided with their part numbers for instrument. Comprehensive warranty should be provided with Principal equipment manufacturer and all other related accessories.

22. The warranty shall cover the maintenance of the whole system including computer with software along with the replacement of spares and accessories during the warranty period.

23. Training in routine operation and maintenance to be provided to two scientists at the company's application facility and also on site whenever necessary.

24. The exhaust panel work should be done by the supplier at no extra cost for the connection of instrument.
25. Only Principal/Manufacturer should quote.
26. Two preventive maintenances for the complete platform should be performed every year during the warranty period.
27. Should have atleast 5 installations in leading Indian universities/institutes and list of installations in India should be provided.

Installation and Training

Complete systems should be installed and commissioned at NIPGR. After successful installation selected scientific/technical personnel from NIPGR should be provided with hands-on and in-depth training on the operation and maintenance of the system as well as specific application training by factory engineers and application specialists for not less than 30 days.

Optional

Company should provide a trained and qualified person (full time) for functioning and maintenance of the instrument for 1 year .

Fluorescence Detector

- Wavelength range 200 - 900nm
- Wavelength accuracy: +/- 3nm.
- Light source: Xenon lamp
- Cell Volume: <= 8ul
- Bandwidth: 20nm or better
- Sensitivity: S/N. Raman peak of water at 450nm > 1000 with dark current method

Corrigendum for LC-ICP-MS tender after pre-bid

4. Mass Analyzer:

Amended to 2-3 MHz frequency

12. Performance:

High TDS greater than 2.5% with variable dilution factor applicability should be offered. Minimum 15 fold dilution capability should be there in the system.

15. LC-ICP-MS Interface:

Speciation standard for As, Cr, & Hg should be offered.

Specification for Ultra High Performance Liquid Chromatography (UHPLC) System

1. Pump. 1 No. Maximum pressure setting range: 18000 psi or higher
2. Detector: PDA/DAD Flow cell volume < 2.5 or better
3. Linearity Should be: > 1.5 AU or better

19. Peristaltic Rotary Pump Oil changed to Rotary pump oil

Fluorescence Detector:

Cell Volume <= 8µl