

**Subject: Minor Revisions in the specifications for Inductively coupled Plasma Mass Spectrometry (ICP-MS/MS)**

**Reference: Tender enquiry No. NITJ/PUR/151/19/e-Tender No.50/2020 Dated 13th Oct, 2020 for the supply of ICP MS/MS**

In reference to tender on subject cited above, it is for the information of bidders that detailed specifications for the said tender have been amended as under:-

**Inductively coupled Plasma Mass Spectrometry (ICP-MS/MS)**

ICP-MS/MS system should be capable of analyzing trace and ultra-trace levels (ppt to percent) of multi-elemental in a single run in a variety of matrices i.e. environmental (soil, sediment, rocks, aerosol, ground & sea water, wastewater, etc.), chemical (metal nanoparticles, metal impurities in polymers, oils, plastics, etc.), biological, samples. The system should be capable for speciation analysis (e.g., As, Cr, Hg etc.) using a coupled liquid chromatography (LC) unit.

Sl. No.	Feature	Revised Requirement
1	Design & Certifications	Latest technology bench-top quadrupole ICP-MS/MS with collision/reaction cell for removal of interferences. System should be true MS/MS triple quad system with tandem unit mass filtering capability at Q1 and Q3 both. The system should run in both MS mode and MS/MS mode and should comply IUPAC guidelines. The system should have built-in features of hardware and software compatible with components such as a liquid chromatography (LC) unit for speciation studies.
2	Sample introduction system	<ul style="list-style-type: none"><li>➤ Concentric nebulizer that should be able to connect to an autosampler and port for Argon dilution.</li><li>➤ Low-pulsation, high-precision 10 roller multi-channel peristaltic pump.</li><li>➤ Integrated Peltier-cooled spray chamber (-5°C to +20°C or better).</li><li>➤ Integrated &amp; fully automated software-controlled Argon &amp;OR liquid dilution system with 100-fold or more dilution factor, for analyzing ≥20% TDS with direct sample aspiration without any manual interventions.</li><li>➤ Online internal standard kit with splitter and tubing set.</li><li>➤ Sample introduction system should be able to handle complex matrixes containing high total dissolved solids with direct sample aspiration and without any sample preconditioning and/or liquid dilution. Required accessories should be included.</li></ul>
3	Plasma and torch	<ul style="list-style-type: none"><li>➤ Solid state RF Generator: 27MHz</li><li>➤ RF power range: 500-1600 W or better</li><li>➤ One-piece user-changeable quartz torch with automatic and computer-controlled alignment</li><li>➤ Should have at least four precise mass flow controller (MFC's)/Electronic valves (EPV) for control plasma, auxiliary makeup, carrier gas and makeup/dilution gas.</li></ul>
4	Cone Interface	<ul style="list-style-type: none"><li>➤ The ICP-MS system must have a single interface to achieve all instrument performance specifications without any manual intervention or changeover for high matrix, high sensitivity and high TDS samples.</li><li>➤ Ion lens: off-axis or other suitably designed ion lens in order to provide high ion transmission and low backgrounds.</li></ul>

5	Collision/Reaction Cell	<ul style="list-style-type: none"> <li>➤ Cell must be non-consumable with zero maintenance.</li> <li>➤ Capable of operating in standard, collision and reaction modes (pure or pre-mixed gas).</li> <li>➤ Fully automated and software-controlled changeover between standard, collision and reaction models without any manual intervention.</li> <li>➤ Specialized, Independent precise software controlled four mass flow controllers (MFC's)/Electronic valves (EPV) <b>one MFC/EPV for collision &amp; three MFC's/EPV</b> to support various reaction gases i.e. NH<sub>3</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>3</sub>H<sub>4</sub>, C<sub>3</sub>H<sub>8</sub>, CH<sub>3</sub>F, CF<sub>4</sub>, NO, N<sub>2</sub>O, CO, CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub> etc. Three or more independent reaction Gas line should be offered, enable to utilize these gases.</li> </ul>
6	Mass analyzer and detector	<ul style="list-style-type: none"> <li>➤ Q1 and Q3 must have unit mass filtering capability as per IUPAC, without any hardware or software adjustment.</li> <li>➤ Mass range: 2-260 amu or better.</li> <li>➤ True linear dynamic range: 10 orders of magnitude</li> <li>➤ Mass scan speed: 3400 amu/s or better</li> <li>➤ Dwell time: 100us or better</li> </ul>
7	Guaranteed performance specifications	<ul style="list-style-type: none"> <li>➤ Sensitivity Mcps/ppm</li> <li>➤ <b>Low mass, Be or Li : &gt; 15 or better</b></li> <li>➤ Mid mass, In Or Y : &gt; 300 or better</li> <li>➤ High Mass, Tl Or U : &gt; 300 or better</li> <li>➤ Detection Limit no gas mode (ppt)</li> <li>➤ Low mass ,Be or Li : &lt;0.5 or better</li> <li>➤ Mid mass, In Or Y : &lt;0.1 or better,</li> <li>➤ High Mass Ti Or U Or Bi : &lt;0.1 or better</li> <li>➤ Sulphur &amp; Phosphorous 3 sigma D.L in KED or reaction mode : &lt;300 ppt or better</li> <li>➤ <b>Oxide Ratio: CeO/Ce : &lt; 3 % or better</b></li> <li>➤ Background ( no gas or KED mode) (low and high mas: 0.5 cps or better</li> <li>➤ Long term and short-term stability: &lt;4% or better</li> <li>➤ Isotope ratio precision [%RSD] Ag : 0.3% better</li> <li>➤ Abundance Sensitivity in MS/MS mode (low and High Mass) @ Cs/U: Guaranteed for better than 1X10<sup>-10</sup> or 0.05ppm</li> </ul>
8	Vacuum system	<ul style="list-style-type: none"> <li>➤ Suitable turbo molecular pump, corrosion resistant and protected.</li> </ul>
9	Software	<ul style="list-style-type: none"> <li>➤ Original licensed copy of software to be provided.</li> <li>➤ Windows-based software (compatible with the latest versions of Windows)</li> <li>➤ The system software should support the following calibration curve fit modes for quantitative analysis: linear least squares, weighted linear least squares, linear forced-through-zero least squares, quadratic, and method of standard additions (matrix-matched calibration).</li> </ul>
10	Liquid chromatogra	<ul style="list-style-type: none"> <li>➤ Liquid chromatography (LC) unit for speciation: Fully automated LC-ICP-MS operation for speciation studies for As, Cr, Hg and Se. The LC unit should consist of suitable <b>Quaternary pump (5000 psi or more capacity)</b>, high-performance liquid</li> </ul>

	phy (LC) unit for speciation studies	<p>chromatography (HPLC) pump with degasser, LC autosampler (<b>≥90 vials capacity &amp; pressure compatibility of 5000 psi or more</b>). Standards and columns for speciation analysis of As, Cr &amp; Hg should be provided. The chromatography software module should be controlled &amp; integrated with ICP-MS software for analysis.</p> <ul style="list-style-type: none"> <li>➤ Additional Consumables :Offered vial and cap 1000 Nos. (01Sets), PEEK tubing 5 m (02 sets), PFT frit (10 Nos.), glass mobile phase filter (02 sets), rotor seal (02 sets), pump seal (02 sets), needle (02 sets), and needle sheet (02 Nos.).</li> </ul>
11	Microwave digestion system/ for sample preparation	<p>Front Loading 12 or more vessel rotor, microwave power ≥1800 W, vessel volume: ≥80 ml, maximum operating temperature: ≥240°C (designed temperature ≥300°C), maximum operating pressure: ≥50bar (designed pressure ≥100 bar), IR/contactless temperature sensor for temperature monitoring of each vessel, integrated keypad/touch screen control, pressure-activated venting, chemical- (especially, acid) and corrosion-resistant cavity chamber and vessels, TFM/PTFE vessels, flexibility in terms of customized method creation, compliance with international safety standards, method compliance with US EPA 3052, US EPA 3051A, ASTM D4309-96, ASTM D-5765, ASTM D-6010-96. Additional Consumables: vessel cover (12sets), vessel spring (12 sets), and vessel liners (05 sets). "Vent &amp; Reseal" Technology should be there for better recovery of volatile elements like Hg &amp; Cd.</p>
12	Other required accessories	<ul style="list-style-type: none"> <li>➤ Autosampler: ≥220 vials capacity, completely sealed/covered enclosure &amp; duct for Exhaust. Microplate/wellplate autosampler accessories for micro-volume sample analysis, i.e., 700-800 µl or better.</li> <li>➤ Complete HF resistant kit including PFA nebulizer, PFA spray chamber, torch, injector, Pt cones should be included.</li> <li>➤ Single nano participle comprehensive module including software &amp; or hardware for estimation of Number of particles, particle concentration, particle size &amp; particle size distribution.</li> <li>➤ NIST calibration standards 22-23 elements (1000 ppm, 125 ml and 100 ppm, 125 ml). NIST calibration standards 22-23 elements (10 ppm, 125 ml), Hg Single element standard (10 ppm, 125 ml). Internal Standard 500ml (5 element mix)</li> <li>➤ PC and Printer: i7 PC with 16 GB RAM, 1 TB hard disk, 27-inch TFT/LED monitor or factory-configured workstation with equivalent specifications, along with antivirus, MS office, and ICP-MS software. A compatible color laser printer with scanning ability should be included.</li> </ul>
13	Items for installation requirement	<ul style="list-style-type: none"> <li>➤ All necessary pre-installation requisites/consumables including chemicals, acids, gases and standards for complete installation and demonstration of the instrument need to be supplied.</li> <li>➤ Gas cylinders with regulators: Argon - 06 Nos., Helium - 01 Nos., reaction gas cylinders i.e. NH<sub>3</sub>, Hydrogen, Oxygen - 01 set each. Gas Panel as per requirement and suitable 20 KVA online UPS with 60 min backup. Manifold with four-cylinder capacity for Argon. Gas line installation.</li> <li>➤ Suitable exhaust fume hood assembly for ICP-MS. Autosampler and microwave digestion system.</li> <li>➤ Compact and low-noise chiller unit(s) as per manufacturer's recommendation and suitable for Indian conditions.</li> <li>➤ Inorganic Speciation standards and columns for As, Cr, Hg .</li> <li>➤ Nanoparticle standards Au &amp; Ag (03 concentration each)</li> <li>➤ Auto-tuning standards.</li> <li>➤ 05 L ICP-MS Suprapure/ICPMS grade Nitric acid, 05 L Suprapure /ICPMS grade Hydrochloric acid, 250 ml Suprapure /ICPMS grade Hydrogen Peroxide, 02Ltr Suprapure/ ICPMS Grade Hydrofluoric acid.</li> </ul>
14	Consumables	<ul style="list-style-type: none"> <li>➤ Ni sampler, skimmer cone set (03 sets)</li> </ul>

	(all items should be mentioned with part numbers from OEM)	<ul style="list-style-type: none"> <li>➤ Pt sampler, skimmer cone set (01 sets)</li> <li>➤ Standard injector and torch - 03 Nos.</li> <li>➤ Standard spray chamber - 01 Set</li> <li>➤ Standard peristaltic pump tubing for drain (pk/12) - 5 Nos.</li> <li>➤ Standard Peristaltic pump tubing for samples (pk/12) - 5 Nos.</li> <li>➤ Peristaltic pump tubing for ISTD (pk/12) - 5 Nos.</li> <li>➤ Tubing autosampler to peristaltic pump - 10 Nos.</li> <li>➤ Tubing for spray chamber drain (4.0mm id, 2.5m)-03 sets</li> <li>➤ PFA sample tubing, 0.5mm id, 1.6mm od, 5 m- 03 Sets.</li> <li>➤ PTFE tubing for internal reaction cell gas, 1/pk (02 set)</li> <li>➤ Carrier/Make-up/Dilution gas tubing (02 each)</li> <li>➤ Sample tubing for MicroMist nebulizer, 0.5mm id, 10/pk</li> <li>➤ Graphite gasket for Sampling cone (3/pk) -03 set</li> <li>➤ Oil element/mist filter - 01 sets</li> <li>➤ Pump oil (1L) - 10 sets</li> <li>➤ RF coil - 01 set</li> <li>➤ Screw, spacer and O-ring for cell - 02 sets</li> <li>➤ Fluid filter for chiller - 02 sets</li> <li>➤ Fluid for chiller - 03 L</li> <li>➤ Cone cleaning solvent - 04 L</li> <li>➤ Swab (cotton-tipped both ends) - 200 Nos.</li> <li>➤ Alumina Powder 100 gm - 02 sets</li> <li>➤ Autosampler vials - 1000 Nos.</li> <li>➤ Standard autosampler probe</li> <li>➤ Autosampler complete tubing set - 01 sets</li> <li>➤ Autosampler vessels pk/1000</li> </ul>
15	Warranty	Three year of comprehensive warranty from the date of installation without any additional cost to the purchaser. The warranty should cover ICP-MS, LC unit, microwave digestion system, UPS, fume hood etc (except consumable items)
16	Pre-installation requisites	<p>Comprehensive guidelines /requisites for development of pre-installation infrastructure, including requirement of air-conditioning, UPS etc., with their specifications, to be provided. (Should be provide pre-Installation report)</p> <p>Any local ancillary instrument / equipment necessary to run the system, in addition to the above, should also be provided by the vendor.</p>
17	Support and Experience	Supplier must have experience to supply and support at least three ICP-MS/MS systems in India (including one with speciation studies). User list and details must be enclosed along with compliance statement. Published documents must be enclosed as

		supporting. Vendor must provide all published documents as supporting documents.
18	Delivery	Vendor must offer goods FOR NIT Jalandhar, including clearance, insurance and transportation. DSIR/CDEC certificate will be provided accordingly by NIT Jalandhar

**Further the last date of submission of e-tender has been extended as under:-**

<b>I</b>	<b>Last date of submission of online bids</b>	<b>End Date: 18.11.2020 upto 11:00 AM</b>
<b>II</b>	<b>Physical submission of Tender Fee and EMD</b>	<b>End Date: 19.11.2020 upto 11:00 AM</b>
<b>III</b>	<b>Opening of Technical e-Bid (online)</b>	<b>19.11.2020 at 11:00 AM</b>

Other terms and conditions will remain same. Bidders are requested to apply accordingly.

**Registrar**