

INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY (ICPMS)-1No.**Doc. No: ST/12/ICPMS/2016-17/10****Application:**

For elemental analysis of trace metals (ppb & ppt) in water and biological samples like Serum and Urine, etc.

Features:

- The sample Introduction system should have very low dead volume
- Close coupled, four channel integral peristaltic pump or any suitable pump
- Torch position should be completely computer controlled and auto tunable in XYZ axes with movement in each axis independent of other two.
- Auto alignment of the torch after routine
- Digital driven programmable with auto tuning features.
- RF generator should be efficient in range variation and superior ionization when changing from aqueous to organic samples with auto impedance matching.
- All ion lens or quadrapole ion guide should be outside the high vacuum region for maintenance free replacement for operator. The sample Introduction system, Torch, Injector & cones should be easily accessible from the side to ease of use.
- Full colour view of plasma to monitor the Injector, Torch & Interface cones, allowing the operator to optimize O₂ flow.
- Quadrapole / lens cleaning / replacement should be without need of put off or open the instrument. Maintenance free lens.
- Plasma Ignition must be automatic.
- Auto tuning facility should optimize plasma condition, lens & cell voltage, mass resolution & mass accuracy.

Specifications:**Sample Introduction:**

- The equipment should be provide with all the gases for Nebulizer, auxiliary, plasma, CCT gases, Reaction should be controlled by Mass Flow Controller.
- Torch position resolution and reproducibility: 0.1mm or better in three axis (XYZ) with auto tune

Ion Source and RF plasma:

- Computer controlled 27 MHz and above RF generator operating from 500 to 1600 watts
- Background values for Ni & Pt cones should be <1cps

Ion Extraction Interface:

- Standard large orifice Ni/Pt sampling and skimming cones diameter should suit all application
- Rapid mounting and removal cone.

Quadrupole Assembly:

- Mass range: 2-260 Amu or more
- Scanning speed: > 5,000 amu / sec .or higher.
- Mass Stability: $\pm 0.05 \mu/\text{day}$

Ion Detector Assembly:

- Dual-stage discrete dynode electron multiplier or equivalent, over a full 9 orders magnitude of dynamic range in a single scan using both analog and pulse ion counting mode

Cell Technology:

- The system must have capability to run the Instrument in all three modes Standard Mode (no Cell or cell Gas), Collision mode (using He & KED to remove the Polyatomic Interferences on some elements) and reaction mode .
- The Cell should have cooling sample Introduction system when working in Collision or Dynamic reaction mode.

Performance Specification:

- Operating voltage: 220V, 50Hz
- CeO/Ce Ratio: <3 %
- Ce⁺⁺/Ce⁺ ratio: <3 %
- Background noise: <1cps or better
- Isotopic Ratio Precision: <1 % RSD.
- Sensitivity:
 - Li > 3.0×10^6 cps/ppm
 - Co > 15.0×10^6 cps/ppm
 - In or Y > 40.0×10^6 cps/ppm
 - U or Th > 60.0×10^6 cps/ppm.
- Abundance Sensitivity: $\leq 5 \times 10^7$ or lower
- Short term stability (%SD) less than 3% or better (over 20 minutes)
- long time stability (%SD) less than 4% or better (over 2 hours)
- Software package should be comprehensive to handle the following basic options:
 - Acquisition in full spectrum, peak hopping and time resolved modes.
 - Auto-tuning of the instrument from a cold start.
 - Data analysis that is supported using isotope ratios, isotope dilution, external and standard calibrations with or without internal standards.
 - Should support semi-quantitative analysis with rapid screening of unknowns
 - Data archival and retrieval functions.
 - Data Reporting and Macro Programming of customized analysis routines.
 - System diagnostics software.

All Accessories and Standards (ICPMS):

- Installation and Operational kits for installation and demonstration
- Multi element Performance Standards

- Required cylinders to be quoted along with suitable regulators. For cylinders should provide test certificate from manufacturers and no objection certificate from explosive department, Nagpur.
- Gas filters for all the gases used. Any mixing of gases required to be quoted.
- Should provide detection limits (DL) chart for as many elements as possible.
- Suitable branded online UPS with batteries for a minimum backup time of 1hr.
- Branded PC and Printer with necessary accessories and softwares.
- Suitable International branded Re-circulating chiller for sample injection and plasma cooling.
- Also quote for spares and consumables required for all the operations for one year.
- Warranty should be three years comprehensive and 2 years non – Comprehensive on complete system including computers, UPS, Chiller, etc.
- Any other items required to be quoted to complete the system.

End user Metal of interest for analysis: Lead(Pb), Arsenic(As), Mercury(Hg), Copper(Cu), Cadmium (Cd), Calcium(Ca), Magnesium(Mg), Iron(Fe), Manganese(Mn), Selenium(Se), Strontium(Sr), Uranium(U)