

Indian Institute of Technology Kanpur

Department of Chemical Engineering

Enquiry No: JKS/CHE/2014-15/Nov/02

Dated: 11-11-2014

Sealed quotations (**separate technical and commercial bid**) are invited by post/courier; for the supply of following system as per the specifications mentioned below along with complete terms and conditions. Party must attach all the related certificates like Agency certificate, Proprietary item certificate (if applicable) etc. Quotation not accompanied with proper certifications will be rejected.

Your offer should reach us on or before November 24, 2014 at the following address.

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For any technical clarification, please contact anithak@iitk.ac.in

ICP-MS SYSTEM SPECIFICATION

Sample introduction system: The sample introduction system comprises of peristaltic pump, nebulizer, and spray chamber. The details are as below:

Peristaltic pump: A multi channel (>10 rollers) peristaltic pump which can support variable flow rates, with three separate channels , 1) for sample introduction , 2) for Internal standard, 3) Spray chamber drain.

Nebulizer: It must include aPFA nebulizer as standard having high resistance to acids.

Spray Chamber: A Peltier cooled, temperature controlled quartz spray chamber (1 No).

ICP torch

The ICP torch should meet the following requirements & features:

The ICP torch: quartz torch with 2.5 mm ID injector

Precision torch adjustment: Complete Computer controlled adjustment of the position of the torch in X, Y and Z directions with independent movements in the three directions.

Precision gas control: Three computer controlled mass flow controllers for controlling all the plasma gas lines precisely (nebulizer, plasma and auxiliary gas flow)

RF power source for ICP torch:

RF Generator (source): ~27.12/ 40MHz frequency, solid state power source, crystal controlled.

Forward power: 500 - 1600 Watts variable.

Plasma shut down: automatic shut down of the plasma by the system after completion of analysis.

Interface

High matrix tolerant interface with High purity nickel cones having apertures of at least Sample cone ~1.1 mm. Skimmer cone ~1 mm diameter. A set of Platinum cones should also be supplied as standard accessory.

Collision - Reaction cell

The system must be having a Cell capable of using He collision Mode with KED.

There shall be provision to use following gases in the cell : Hydrogen/Methane/Ammonia

Provision for oxygen should be given as an option item.

The system should be capable of running the Reaction, Collision & Standard Mode in a single run.

Ion optics

Ion optics should have excellent focusing with off axis system to analyzer and detector to eliminate photons and neutrals.

Background noise must be less than **<1 cps** at 4.5/ 9 amu.

Quadrupole mass analyser

RF generator: Should be 2 MHz or higher

The system should have the facility for overcoming the low mass based interferences.

Vacuum system

Should have rotary pump and turbo molecular pump with split flow for extremely high gas throughput. Vacuum should be better than 1×10^{-5} mbar in open valve condition and shall be better than 5×10^{-5} mbar in closed valve condition.

Quadrupole material

Made of molybdenum or stainless steel rods with RF pre-filters.

Mass range: (5-260) amu.

Scan rate: > 3000 amu/sec

Resolution:

Computer controlled settings for quadrupole resolution adjustments are to be demonstrated. The best possible quadrupole resolution should be indicated in the offer.

Detector

Ion detection with electron multiplier shall ensure better than 9 orders of linear dynamic range using simultaneous analog/pulse counting. It shall be possible to measure major and minor concentrations in a single analytical run.

Should have over range protection and fully automated detector cross calibration with good linearity

The detector shall be easily replaceable by the user.

Both the analog and pulse counting modes should be protected against overload. Minimum dwell time 100µS in both pulse counting and analog mode.

Detector should be having minimum life of 3 years without replacement.

Performance criteria

Guaranteed Sensitivity- *Typical Sensitivity performance not to be considered.*

Li/Be $\geq 50.0 \times 10^6$ cps/ppm

Co $\geq 60.0 \times 10^6$ cps/ppm

In or Y $\geq 200.0 \times 10^6$ cps/ppm

U /Tl/Th $\geq 110.0 \times 10^6$ cps/ppm.

Signal stability:

Short term stability (%SD), less than 2% (over 10 minutes) and

long time stability (%SD) less than 2% (over 2 hours) shall be demonstrated.

Oxide ratio

CeO/Ce (%) <3

Doubly charged ratio (%)

Ba^{2±}/Ba (%) - <3

Isotope ratio precision — (%SD) Ag107/Ag109 <0.1

Mass Stability: 0.05 amu/8 hours or better

System control and data acquisition:

The system should perform auto optimization of plasma parameters like plasma power, plasma gas flow etc. The instrument software shall allow auto - tuning to enable the instrument to be used with the consistent and reproducible day to day performance independent of the operator.

Acquisition mode: Peak Jumping, scanning, Time resolved analysis, Isotope Ratio measurements using integral software.

Analysis mode: Shall allow for semi quantitative analysis, external calibration and internal standard addition methods for fully quantitative analysis, allowing parts per trillion level analysis and isotope ratio measurements with precision better than 0.2 %.

Report Generation: Output results formatted in mixed concentration units e.g. ppt, ppb, ppm etc.

Quality control and software: Software for automated QA/QC during unattended operation. CFR 21 part 11 tools must be offered as standard and should be a part of ICMS software. Offline data processing and exportability of data to other standard packages should be available. Matrix specific databases to provide preferred isotope selection should be available.

Master copies of all relevant software must be supplied. All instruction manuals and service manuals must be supplied along with the instrument.

Warranty: The system should carry warranty for 3 year from installation, against any kind of manufacturing defects. The warranty should be a part of the total ICP-MS system supply.

Multi-element NIST traceable standard: 2 No.

Fume exhaust for ICP-MS system – 01 set

The fume exhaust system should include flexible metallic bellows, clamps, exhaust fan and other accessories. This fume exhaust for ICP-MS system is required for removal of the gases emerging from ICP-MS system.

Gas supply system to ICP-MS system – 1 Set

The gas supply system is meant to provide required gases to the ICP-MS system at specific purity, pressure and flow rates. Such a gas supply system should include:

- i. Gas cylinder for Plasma formation – Argon
- ii. Gas cylinder for Collision & Reaction gases – Helium & Hydrogen
- iii. 2 stage Gas pressure regulators for each cylinder
- iv. Gas purification panels
- v. Gas supply manifold for switching gas cylinder
- vi. SS tubing

UPS system with battery backup – 1 Set

30 mins UPS power backup for the entire ICPMS system and sub systems requirement with maintenance free batteries should be supplied. Battery storage rack should be a part of this UPS battery backup system. UPS power system should be covered under maintenance warranty.

One standard PC, one 23 inch TFT monitors along with necessary software for controlling the ICP MS system, 1 color Laser printer must be supplied at no extra cost.

Consumables: The vendor must offer 3 years consumables as optional items.

Optional Items: The following optional item should be provided.

- Additional Oxygen Gas Line for reaction chemistry suitable for Oxygen/Ozone based applications
- Laminar air flow hood with positive pressure for sample preparation of highly sensitive nano samples.

Terms and conditions

- Separate technical and commercial bids are to be submitted.
- Standard comprehensive warranty and support should be three years.
- Details of Annual Maintenance Contract (AMC) after standard warranty.
- Pre-installation requirements should be clearly specified in the quotation.
- Spares and consumables: A list of spares included with the equipment, sufficient number of rapidly wearing and consumable parts are to be included to cover the guarantee period
- Other necessary spares if not mentioned above.
- Installation: the price should be inclusive of full installation on site with full functionality demonstration.
- Training & Installation at our site should be done free of cost.
- Maximum education discount, if any, should be offered.
- Quotation should be valid for 60 days.
- Quotation should also carry certificates such as agency certificate, proprietary certificate, patent if any etc.
- All envelopes should be marked with enquiry number.
- Indian quotes should be in Indian Rupees (INR) on FOR destination basis. Foreign supplier needs to quote on CIP basis.
- Financial bid of the technically qualified vendor will be opened only after successful demonstration if institute wish to do so.