



OFFICE OF THE DEAN ADMINISTRATIVE AFFAIRS
Indian Institute of Engineering Science and Technology, Shibpur
(Formerly Bengal Engineering and Science University, Shibpur)
P.O.: Botanical Garden
Howrah – 711 103

Date: 03/02/2018

Corrigendum

Tender ID: 2018_IEST_295023_1

Tender Reference Number: e-Proc/DEANRES_18012018/ HRMS_IEST/170

Name of the work: Quadrupole Time of Flight High Resolution Mass Spectrometer HRMS system with facility to connect Fast Liquid Chromatography system using lesser than 2 micrometer particle size columns for high sensitivity for both qualitative and quantitative analysis

Kindly note that:

The following changes are to be considered in the above mentioned tender.

Sd/-
Dean, Administrative Affairs
IEST, Shibpur

3. Technical Specification: Quadrupole Time of Flight High Resolution Mass Spectrometer HRMS system with facility to connect Fast Liquid Chromatography system using lesser than 2 µm particle size columns for high sensitivity for both qualitative and quantitative analysis.

(Both the Liquid Chromatography (LC) and quadruple time-of-flight (QToF) Mass spectrometer (MS) must be manufactured, supplied and installed by a single vendor to provide a seamless integration between the LC and MS. The single vendor shall be responsible for the main instrument and all the accessories supplied with the system.)

<ul style="list-style-type: none"> • Ionization Source : 	<ul style="list-style-type: none"> • The instrument must be equipped with combined/dual electrospray ionization (ESI) and atmospheric pressure chemical ionization (APCI) as standard capable of handling flow rates upto 2 ml/min. Sample introduction must be possible either directly or combined with suitable liquid chromatographic system automatically through integrated fluidics or via external syringe pump. • The combined/dual ionization (ESI & APCI) source must operate along with reference spray to facilitate automated accurate mass measurements within single LCMS experiment. The instrument should be capable of internal reference mass correction for MS and MS/MS operation without losing sensitivity. To facilitate automated accurate mass measurements within single LCMS experiment, the ionization source must incorporate a primary ESI probe and a secondary ESI probe to introduce a reference mass, and allow indexed sampling of the two sprayers to avoid interference between analyte and reference spectra. The ionization must be done both in a positive & negative modes. • The ion source must be of orthogonal design. The nebulized sprayer must be positioned orthogonally to the sampling orifice for maximum source longevity and analyser protection against "dirty" samples. The cleaning of the source should be done without venting the system and facility to Vacuum Interlock should be provided.
<ul style="list-style-type: none"> • Ion Optics : 	<ul style="list-style-type: none"> • Latest Technology ion optics must be available which should maximise sensitivity while maintaining system robustness.
<ul style="list-style-type: none"> • Desolvation Temperature 	<ul style="list-style-type: none"> • The Desolvation Temperature must be more than or equal to 600 °C.
<ul style="list-style-type: none"> • Quadrupole : 	<ul style="list-style-type: none"> • Instrument should have Quadrupole for isolation followed by collision cell and appropriate assembly required for high resolution mass data. An isolation valve/suitable device must be available to allow the source elements to be removed and cleaned without breaking instrument vacuum, maximizing instrument uptime. The routine maintenance should be tool free and user friendly. • The instrument should be equipped with a segmented quadrupole collision cell for superior ion transmission characteristics leading to enhanced resolution and sensitivity. Specific design must be shared or submitted which must show the same. • Precursor ion selection should be done using Quadrupole. • Mass Range: The instrument must have a high mass filter (quadrupole) for efficient transmission of ions having mass range at least ≤ 30 to $\geq 32,000$ m/z in resolving mode & ≤ 30 to $\geq 1,00,000$ m/z in non-resolving mode or better. A segmented Quadrupole collision cell for fragmentation purposes should be available.
<ul style="list-style-type: none"> • Time of Flight 	<ul style="list-style-type: none"> • Analyzer: Geometry with quadrupole as Q1 followed by TOF with a collision

(TOF) :	<p>cell in between should be present.</p> <ul style="list-style-type: none"> The mass range of the Time of Flight analyzer must be at least ≤ 30 to $\geq 1,00,000$ m/z. The TOF mass analyzer must have linearity of response of 4 orders of magnitude whilst maintaining specified resolution for quantitation purposes.
• Resolution :	<ul style="list-style-type: none"> The resolution of the TOF mass analyzer must be more than 40,000 FWHM or better between m/z 950-960 and more than 35,000 FWHM or better of around 200 m/z. <i>(Proof of Statement must be provided)</i> Data acquisition rate must be 30 Spectra per second or better in MS and MS/MS mode. <i>(Proof of Statement must be provided)</i>
• Mass Accuracy & Sensitivity :	<ul style="list-style-type: none"> The mass accuracy of the system should be a minimum of less than 0.5 ppm, with both internal & external calibration standards for both MS & MS/MS modes on 10 consecutive repeat measurements on column analysis. The instrument must be sensitive enough for detecting sub ppb/femtomole levels of compounds. The sensitivity achieved in MS/MS modes must be stated. The signal to noise (S/N) ratios or counts per second must be specified along with the full analyses conditions. <u>Sensitivity</u>: Full MS/MS mode ≤ 10 femtogram on column, at S/N ratio $\geq 600:1$ [Mention the standard sample(s) used]. <i>(Proof of statement must be provided for S/N ratio)</i>
• Scan modes & Capability :	<ul style="list-style-type: none"> The instrument must be able to operate in MS Scanning, MS/MS product Ion Scanning, Simultaneous MS & MS/MS scanning modes. The software should be capable of data acquisitions whereby high and low collision energy data is acquired simultaneously to provide fragmentation data for all detectable molecular ions and TOF-MRM.
• Vacuum System :	<ul style="list-style-type: none"> A high efficiency vacuum system with turbo molecular pumps followed by rotary mechanical pumps must be provided.
• Softwares :	<ul style="list-style-type: none"> The software should have capabilities to perform the following functions: Automated mass calibration, resolution, sensitivity check should be performed by software. Software tools for addressing Screening, Component Identification & Structural Elucidation workflows. The data processing software must incorporate an elemental composition calculator as standard. Included into the calculator must be algorithms for isotope pattern modeling that allow data interpretation of actual isotope patterns. A goodness of fit from actual to theoretical isotopes must be included. The ability to filter out incorrect elemental composition calculations through the use of intelligent spectral interpretation algorithms must be incorporated. Software should give elemental formula with mass accuracy or ppm error and isotopic fit value (Including halogen filters by matching theoretical and actual spectral pattern). The model offered by the vendor should have capability to demonstrate the above mention parameter like fast LC, high resolution, high mass accuracy in one single run.
• Computer & Workstation :	<p>A Workstation should be provided for controlling the mass spectrometer, the LC and the auto-sampler with data acquisition & for data processing and analysis with following specification:</p>

	<ul style="list-style-type: none"> • Memory: 64 GB (8 X 8GB) DDR4 2133Ghz or better • Hard disk: 10 TB or better • CPU: Dual-Processor E5-2637 v3 Processor (3,5GHz 4c); Operating system: Windows 7 Professional 64 - bit or better. • 21 inch LCD monitor. • 1 Laser jet printer. • All hardware and software including drivers, monitor, device interfaces cards/network must be preinstalled and preconfigured on the computer provided.
<ul style="list-style-type: none"> • Nitrogen Generator : 	<p>A noise free Nitrogen Gas Generator with in-built compressor along with other Gas cylinder should be provided to operate the system. The Maximum gas output pressure must be 100 psi. The Maximum outlet Flow Rate must be 32 L/min.</p>
<p>Fast UHPLC System: A liquid chromatography system as an inlet to the Mass spectrometer with following specifications:</p> <p>The chromatography system should be capable of being operated both as a HPLC & Fast UHPLC by interchanging the column chemistries.</p>	
<ul style="list-style-type: none"> • Pump : 	<ul style="list-style-type: none"> • Quaternary operating pump(s) with an operating pressure of minimum 15000 psi or better.
<ul style="list-style-type: none"> • Flow Rate : 	<ul style="list-style-type: none"> • The flow rate range should be 0.010 to 2.000 mL/min, in 0.001 mL increments.
<ul style="list-style-type: none"> • Degasser : 	<ul style="list-style-type: none"> • The instrument should have in-built Vacuum degasser facility with minimum four lines and should be efficient to remove dissolved air online. •
<ul style="list-style-type: none"> • System Delay Volume : 	<ul style="list-style-type: none"> • System Delay Volume should be less than 400µl (<400µl), independent of system backpressure & with standard mixer for higher sensitivity.
<ul style="list-style-type: none"> • Autosampler : 	<ul style="list-style-type: none"> • Autosampler should be available with a capacity of approx. 80 vials or more of 1.5 ml or better capacity & sufficient no. of spare sample vials must be provided. The autosampler should have cooling facility upto 10 degrees or better and heating upto 40 degrees or better. • Programmable injection volume from 0.5 µl to 20 µl or better must be available. • The carryover of the autosampler must be less than 0.005% or better. • Compressibility Compensation should be Automatic & Continuous.
<ul style="list-style-type: none"> • Column Oven : 	<ul style="list-style-type: none"> • Column Temperature Control should be from 20 deg. C to 90 deg. C or better.
<ul style="list-style-type: none"> • Columns : 	<ul style="list-style-type: none"> • Sub 2 microns (1.7µm / 1.6µm) C18, C8 & HILIC UHPLC/UPLC Columns for the analysis should be Quoted with Smaller Dimensions with a pH level of 2 – 12. Chiral Column should also be Quoted for Chiral compounds separation • Column usage history tracking technology must be provided so that all the information should be available related to the usage of the columns & archives all of them.
<ul style="list-style-type: none"> • UPS : 	<ul style="list-style-type: none"> • A suitable online UPS of 10 KVA capacity with at least 60 mins back up for the complete system should be provided.
<ul style="list-style-type: none"> • Warranty : 	<ul style="list-style-type: none"> • Comprehensive 5 years minimum from the day of functional installation.

	Please clearly mention the items, if any, which are not included in the comprehensive warranty.
<ul style="list-style-type: none"> Others : 	<ul style="list-style-type: none"> The system must be attended within 48 hrs of reporting. The other gases along with regulators should also be supplied along with the system. Training and Installation: Installation must be done at user's site with no extra costs involved. A one week (at least) general entry-level training-cum-workshop and advanced-level training-cum-workshop must be arranged at the user's site by the vendor on experimental and data analysis part, with no extra cost involved. Proof of Performance documents must be provided with the Compliance sheet. The vendors must submit/upload all the Technical Data Sheets as per their claim in original & authenticated. The specification sheets should also be available in the public portal. Standards/reagents required for successful installation must be supplied.
<ul style="list-style-type: none"> Optional Items 	<ul style="list-style-type: none"> Sub 2 microns (1.7μm / 1.6μm) C18, C8 & HILIC UHPLC/UPLC Columns for the analysis should be Quoted with Smaller Dimensions with a pH level of 2 – 12. Chiral Column should also be Quoted for Chiral compounds separation Price of one spare set of each column should be included as optional item. Bidder selected for supply of Quadrupole Time of Flight High Resolution Mass Spectrometer HRMS system with facility to connect Fast Liquid Chromatography will only be considered for supply of optional items