Tea Research Association

Tender No. TRA-KOL/TLabs/2024-25/02 dated 21.06.2024

The Secretary, Tea Research Association (TRA) invites sealed tenders in two parts (**Technical Bid & Financial Bid**), from reputed manufacturers / authorized dealers/importers for the supply of Instrument / Equipment as per the annexure A and Annexure B. Both the bid documents are to be put in sealed envelopes separately superscribing the words "Technical Bid" & "Financial Bid" which are to be put together in the sealed envelope superscribing the Tender No. The details of instruments/equipment are shown as 'Annexure – A' and 'Annexure B' enclosed herewith.

Last date for receiving bids: July 11, 2024, up to 5.00 p.m.

Terms and Conditions:

1) The tenderer should submit the following documents along with the tender:
   a) Dealership certificate/authorization certificate
   b) List of users
   c) Up-to-date sales tax/GST /income tax clearance certificate
2) Earnest Money 2% (refundable) of the quoted amount: The Earnest Money need not to be deposited by the tenderer along with the Tender document (Financial Bid). The final selected bidder will have to submit the Bank Guaranty of 2% (refundable) of the ordered value in the form of a Bank draft/Bankers certificate in favour of "Tea Research Association" payable at Kolkata within two (02) week of receiving the Purchase Order, failing which the PO will be rejected.
3) Tender Document Cost (non-refundable) of Rs.5,000/- is to be deposited in the form of a separate Bank Draft in favour of "Tea Research Association" payable at Kolkata.
4) Tenders must accompany the product catalogues/specifications.
5) Tenderers must quote the warranty period of the product.
6) Instrument/equipment is to be delivered/installed FOR/CIP at : **Annexure A listed equipment to be delivered at TLabs, Tocklai Tea Research Institute, Tea Research Association, Jorhat, Assam - 785008 and Annexure B listed equipment to be delivered at TLabs, Tea Research Association, Kolkata, West Bengal -700016.**

TRA reserves the right to accept or reject the bids without assigning any reason thereof. The tender document can be downloaded from the website www.tocklai.org.

The tender should be accompanied by a Tender Document Cost of Rs.5,000/-, failing which the tender will be rejected. Tender Document Cost should be enclosed with "Financial Bid" only.

All tenders should be sent to the following address: "**Secretary, Tea Research Association, 113, Park Street, 9th Floor, Block B, Kolkata-700016, West Bengal, India**".

Secretary
Tea Research Association

Annexure – A

Specifications of Equipment (Location: Tocklai, Jorhat, Assam)

Sl. No.	Item	Specifications
1	**LC-MS/MS (Triple Quadrupole) coupled with UV & Fluorescence Detectors** - 1 Unit	**Technical Specification** A Bench Top High Sensitivity Ultra High-Performance Liquid Chromatograph Triple Quadrupole (LC-MS/MS) system coupled with UV & Fluorescence Detectors as a front end for high sensitivity trace level quantitative analysis of pesticides, mycotoxins, pyrrolizidine alkaloids, pharmaceuticals, antibiotics residues analysis from tea, food, agri-horticultural products, drinking water, etc with complete software control to meet global and domestic food regulations like EU, USFDA, Japan, FSSAI, IS, APEDA with following specifications. The Liquid Chromatograph and Mass spectrometer and all Ion Sources must be manufactured, supplied, and installed by same vendor to provide seamless integration between the LC and Detectors. Both the Liquid Chromatograph and different detectors must be fully supported by the supplier to provide a seamless instrument diagnostic between the LC and MS, UV & Fluorescence Detectors. **MS (Triple Quadrupole)** **Mass Range**: 10 - 2000 amu or better **Scan Speed**: 17,000 amu/sec or better in QQQ mode. **Ionization Source**: Dedicated Electrospray ionization (ESI) for high-sensitivity MS that uses superheated nitrogen to improve droplet desolvation and ion generation, for a stronger signal and reduced noise. The Desolvation temperature must be a minimum of 400^0C or above. **Interface**: Rugged source capable of handling large batches of complex sample matrix over a long period of time without performance degradation. The cleaning of source should be possible without venting the system. **Vacuum system**: A robust high efficiency vacuum system with minimum maintenance and utility with low noise level and automatic vacuum lock system. **Triple Quadrupole**: Quadrupole having high standards of mechanical tolerance and minimum coefficient of thermal expansion to ensure highest mass stability. **Mass Resolution**: Must be automatically adjusted to desired resolution (0.50 Da, 0.75 Da or 1.00 Da FWHM) **Sensitivity**: i) MRM ESI +ve 1 pg on column reserpine should give chromatographic S/N greater than 800000:1 without smoothing peak to peak on column at unit resolution (0.7±0.1 amu). ii) MRM ESI –ve, 1 pg of column chloramphenicol should give chromatographic S/N greater than 800000:1 without smoothing, MRM transition 321- 152 at unit resolution (0.7±0.1 amu). **IDL:** ≤4 fg of 10 fg injection in both positive and negative modes.

		MRM Acquisition rate: Should be capable of minimum 400 MRM in a single time period with no loss in sensitivity for co-eluting components at any one point of time. **Collision Cell:** Specially designed collision cell allowing less dwell time, suitable for high sensitivity MRM studies, should be free of cross talk. Ionization source should include dual mode ESI, APCI. It should be easy to change the source without much hassle. **Operating modes**: MS should have following scan options ➢ Full scan ➢ Selected ion monitoring/recording (SIM/SIR) ➢ Product ion scanning ➢ Precursor ion scanning ➢ Neutral loss/gain scanning ➢ Multiple reaction monitoring ➢ Simultaneous full scan and MRM along with matrix monitoring to be performed in a single run ➢ +ve / -ve polarity switching time between alternate MRM scans: 50 ms or less ➢ Automatic and manual tuning. Information dependent acquisition system or equivalent scan mode of MRM to high sensitivity product ion scan for library confirmation. **Dynamic range:** 6 orders of magnitude or better **Detector:** The detector must have a digital range of 1 to e6 cps. It must operate both in +ve and -ve ion modes and back, must be capable of switching polarity rapidly **<u>PDA Detector</u>** **Wavelength range:** 190-900 nm with accuracy ±1 nm with inbuilt filter **<u>Fluorescence Detectors</u>** **Excitation wavelength:** 200-850 nm or better **Emission wavelength:** 220-700 nm or better **<u>HPLC (Fast LC)</u>** Quaternary operating system with in-built vacuum degasser (channel built in degasser) Auto sampler with 100 or more sample capacity Column oven Multicolumn Thermostat with automatic valve switching options to simultaneously work with 4 large columns or 8 small columns **Columns:** 4 no. of 2.1 x 100 mm (1.7-2.5) µm, 4 no. of 3 x 50 mm (1.7-2.5) µm and 4 no. of HILIC column 2.1 x 100 mm (1.7-2.5) µm. coated with suitable phase for effective separation of pesticides aflatoxin, pyrrolizidine alkaloids, mycotoxins, antibiotics, pharmaceuticals 4 no. of suitable column for direct analysis (without derivatization) of glyphosate, gluphosinate ammonium, paraquat, etc. along with suitable guard columns. Necessary kit to be provided for direct analysis of above polar pesticides. **Flow rate:** 0.01 – 2 ml/min. Syringe should be capable of taking even though the sample is

		in less quantity. It should have the facility of keeping the sample in a cooling condition (temperature range from 4-50^0 C) Operating pressure: up to 18000 psi or more Flow accuracy: +5% RSD Flow precision: +0.1% Injection vol.: 0.5-20 µl or more Auto sampler: The Auto sampler must accommodate with 50 to 100 vials Injection accuracy: More than 0.3% RSD Vial capacity: up to 2ml Needle washing facility: Should have needle washing facility from internal and external side programmable Built in dilution and derivative system facility Syringe size: Should accommodate the injection volume stated above. Linearity: > 0.999 coefficient of deviation, Precision: < 0.5% RSD Sample carryover: <0.005% Seal wash: Integral and programmable Column oven Temperature range with control Spares and consumables for 5 years Start up Kit: LC-MS/MS start up kit should be supplied as standard **Quantification software system** Application software for quantitative applications having the additional requirement of Quality Control (QC) checks to satisfy statutory or regulatory requirements (EU, USFDA, Japan, FSSAI, IS, APEDA, etc) must be available. 1) This application must be compatible with LC/MS and LC/MS/MS data. Data should be full scan, SIM or MRM. 2) Data Acquisition, Peak Integration, Calibration, Quantification and QC calculations must be fully automated. 3) Quantification and QC parameters must be stored for each compound and individually selected and loaded into new methods. 4) The quantification method editor must be viewable in page view or as a spreadsheet 5) The application software must allow the monitoring of the molecular ion plus up to 4 confirmatory ions. 6) Technology for system optimization and status monitoring should monitor and perform the following parameters: (a) System parameters checking and alerts (b) Integrated sample/calibrant delivery system and programmable divert valve (c) Automated mass calibration (d) Automated sample tuning (e) Automated SIR and MRM method development (f) LC/MS system checks-automated on-column performance test. 7) The application software must flag samples in the browser report when:

		(a) The ion ratios fall out-with the user-defined values (b) The maximum blank acceptance level (user input) has been exceeded (c) The maximum concentration limit (user input) has been exceeded (d) The concentration is below the reporting concentration limit (user input) (e) The concentration falls below the minimum recovery % level (user input) (f) The concentration falls above the maximum recovery % level (user input) (g) The coefficient of determination for a calibration curve falls below a user-set level (h) QC samples fall outside a user-defined number of standard deviations from the mean (i) The peak of the compound of interest falls below a user defined S/N ratio 8) Software should have the latest library database of around 1000 compounds viz. (Antibiotic residues, veterinary drugs residue, Mycotoxins, Vitamins, Pesticides, etc.) 9) Pesticide database should contain Molecular formula, Mono isotopic mass, Parent ion, Cone voltage (V), Product ion 1, Product ion 2, Collision energy (eV), RT and sensitivity. 10) Simple report format & reporting system software should be ISO compliant. **Computer platform** Hi end workstation PC, i7/i9 processor or higher with 64 GB DDR4 Memory, up to 16 TB SATA hard drive (7200 RPM), DVD-RW, USB port, 27" LCD Monitor with suitable Operating System and LaserJet color printer with back-to-back printing with scanner. MS Office needs to be included. **Nitrogen Generator** Highly reputed international brand of Nitrogen generator with in-built compressor with low noise should provided. Nitrogen gas generator should be supplying high purity, pressure and flow rate as required for the LC-MS/MS instrument. **Gas cylinders** Suitable gas cylinders (UHP) of 03 Nos with all accessories such as stainless-steel double stage regulator, gas purification panel unit, gas purification cartridges, cylinder cage or bracket etc should be supplied and commissioned. The gas lining panel work should be done by the supplier for the connection of equipment. **Uninterrupted Power Supply (UPS)** 20 KVA online UPS with power factor correction and harmonic distortion for the smooth running of LC-MS/MS, nitrogen generator, PC with battery for back up to 3 hrs.

		Warranty Three years warranty with additional CMC quote of 4th & 5th years for LC-MS/MS with UV & Fluorescence detectors, operating software, nitrogen generator, UPS including all spares & batteries, accessories and consumables, computer, printer, at least one Preventive maintenance along with PM kit in each year and unlimited breakdown visits. Should have a good after sales service/technical support capable of reaching at short notice and should attend immediately without fail. **Experience** The supplier should have experience of at least 20 successful installations (at least 10 at food testing labs) and operating LC-MS/MS in India**.** **Training** Training has to be provided free of cost during the installation and commissioning of the equipment for a period not less than 7 days. Trouble shooting training as and when required. The application support has to be provided by the company for the development of method and analysis of sample for which the LC- MS/MS instrument purchased at customer site. Validation and IQ/OQ/PQ documents for both LC modules and MS components, the Installation Qualification, Operational qualification and Performance Qualification of the instrument (LC and MS) has to be performed at the time of installation. The operational and performance qualification of the instrument has to be performed at least once in a year or after major breakdown of instrument. The job will be done free of cost during warranty period. At the time of supply of the instrument the IQ/OQ/PQ documents in soft and hard copies and essential validation kits for LC and MS has to be supplied free of cost. **Other Conditions:** Model & year of introduction of the Instrument should be mentioned in the tender along with original brochures/catalogues.
2	**GC-MS/MS (Triple Quadrupole) coupled with Head Space & SPME** - 1 Unit	**Technical Specification** A Bench Top Highly Sensitive Gas Chromatograph Triple quadrupole mass spectrometer (GC-MS/MS) System for pesticides, ethylene oxide, acrylamide residues, volatile flavouring compound analysis from tea, food, agri-horticultural products, drinking water, etc with software to meet global and domestic food regulations like EU, USFDA, Japan, FSSAI, IS, APEDA with following specifications. **GC Column Oven** **Temp range**: Ambient + 5°C to 450°C ➢ Should support minimum 10 oven ramp steps ➢ Fast oven cooling 450°C to 40°C in less than 5 minutes **Inlet:** Two inlets are required: one split / split less inlet and second one with large volume injection facility (PTV or equivalent)

		➢ Pressure range: 0–1000 kPa (0–145 psi) ➢ Split Ratio: up to 12000:1 or better ➢ Fast cooling facility for PTV preferably with Air **Gas flow control:** Should be able to run in constant flow, ramped flow, constant pressure and ramped pressure modes. ➢ Pressure set points minimum increments: 0.005 psi in all ranges. ➢ Electronic pneumatic control for auto pressure regulation for split / spitless operation, septum purge. **Auto sampler:** Should be able to inject into both the inlets (split/split less and PTV) simultaneously without making any manual hardware changes. ➢ 50 sample vial capacity or more preferably 100. ➢ PTV Head Space auto sampler system ➢ A headspace sampler having sample capacity of 30 or more vials. ➢ The system should be able to operate HSS and ALS on the same system without any manual changes. The whole unit should be operable using the system software. **Back flush technology:** Automated back flush is required to ensure column life and low maintenance of the system. **SPME:** Compatible HS-SPME system **Columns:** 4 no. of 5ms (5%-phenyl) methyl polysiloxane phase capillary column with very low bleed characteristics for effective separation of pesticides 4 no. of suitable column each for direct analysis of ethylene oxide and its metabolite, acrylamide, volatile flavouring compound analysis. **Electronic Mass Flow Controller:** ➢ Device is capable of controlling flow rates between 5-500 ml/min. should be capable of recording pressures for sample logging and automatic leak checking. **Mass Spectrometer** **Mass Range**: 10 to 1000 amu or better **Mass Analyzer and Filters**: Tripple Quadrupole with filters to remove neutral noise/contamination for better sensitivity, facility for active ion beam focusing. Analyzer Temperature upto 200^0C or better **Scan Mode:** Precursor, Product, Neutral Loss, SIM, SRM, MRM, Full Scan etc. **Dynamic Range**: Minimum 10^6 **Linear Response**: Relative to sample concentration, for a specified compound, must be 6^{th} orders of magnitude from the limit of detection **Ionization Modes**: Electron Ionisation (EI) positive and negative **Electron Energy**: 10 to 290 Electron Volt (EV) user selectable or higher **Ion Source**: Source temperature upto 350^o C or better, Quick change over EI/CI mode, Inert EI source with dual filament **Collision Cell**: Mention the gas used for collision, facility to focus the ion beam for entering into the cell and exit the cell to

		be available Collision energy digitally controlled and specify the voltage **Tune**: Auto tune facility and manual tuning option available. **Resolution**: Should be adjustable from 0.7 Da to 4 Da or Specify. **Dwell Time**: Minimum 0.5 ms or better. **Scan speed**: Minimum 10000 amu/s or better. **MRM Speed**: Minimum 800 transitions/sec or better. **EI MRM sensitivity:** S/N ≥ 20000: 1 or better with 1µL of 100 fg Octafluoronaphthalene (OFN) from m/z 272 >222 transition or otherwise specify the sensitivity in terms of Signal to Noise with the concentration of the chemical and injection volume and m/z transition **IDL:** ≤0.5 fg or better with OFN injected m/z 272 >222 transition **Detector**: Electron Multiplier or Photo Multiplier Provisions for lesser noise by the neutral ions or other contaminations. Please mention the shelf life of the detector. Turbo Molecular Pump Air cooled with suitable capacity to bring fast vacuum. Easy and quick change over from EI or CI Should allow system to withstand carrier gas flow rate as suitable to application and intended use. **Library**: Licensed Latest NIST library with latest version including data on pesticide, environmental pollutants MRM database with more than 1000+ compounds should be quoted. **Computer platform** Hi end workstation PC, i7/i9 processor or higher with 64 GB DDR4 Memory, up to 16 TB SATA hard drive (7200 RPM), DVD-RW, USB port, 27" LCD Monitor with suitable Operating System and LaserJet colour printer with back-to-back printing with scanner. MS Office needs to be included. **Gas cylinders** Suitable gas cylinders (UHP) of 3 Nos each with all accessories such as stainless-steel double stage regulator, gas purification panel unit, gas purification cartridges, cylinder cage or bracket etc should be supplied and commissioned. The gas lining panel work should be done by the supplier for the connection of equipment. **Uninterrupted Power Supply (UPS)** 20 KVA online UPS with power factor correction and harmonic distortion for the smooth running of LC-MS/MS, nitrogen generator, PC with battery for back up to 3 hrs. **Warranty** Three years warranty with additional CMC quote of 4th & 5th years for GC-MS/MS, operating software, UPS including all spares & batteries, accessories and consumables, computer, printer, at least one Preventive maintenance along with PM kit in each year and unlimited breakdown visits. Should have a good after sales service/technical support capable of reaching at short notice and should attend immediately without fail.

		Experience The supplier should have experience of at least 20 successful installations (at least 10 at food testing labs) and operating GC-MS/MS in India**.** **Training** Training has to be provided free of cost during the installation and commissioning of the equipment for a period not less than 7 days. Trouble shooting training as and when required. The application support has to be provided by the company for the development of method and analysis of sample for which the GC- MS/MS instrument purchased at customer site. Validation and IQ/OQ/PQ documents for both GC modules and MS components, the Installation Qualification, Operational qualification and Performance Qualification of the instrument (GC and MS) has to be performed at the time of installation. The operational and performance qualification of the instrument has to be performed at least once in a year or after major breakdown of instrument. The job will be done free of cost during warranty period. At the time of supply of the instrument the IQ/OQ/PQ documents in soft and hard copies and essential validation kits for LC and MS has to be supplied free of cost. **Other Conditions** Model & year of introduction of the Instrument should be mentioned in the tender along with original brochures/catalogues.
3	**ICP-MS hyphenated with HPLC** - 1 Unit	A Bench Top Highly Sensitive System for elemental analysis from tea, food, agri-horticultural products, drinking water, etc with software to meet global and domestic food regulations like EU, USFDA, Japan, FSSAI, IS, APEDA with following specifications. **Sample introduction system:** • Offered System should have in-built, factory integrated Peltier-cooled spray chamber with temperature range from -5^{o}C to 20^{o}C or suitable range as per system hard ware requirement. • System should be capable of analyzing samples with TDS 3-5% or more with software-controlled, variable flow, >10 fold, Aerosol/Argon dilution accessory. No manual dilution or liquid dilution will be accepted. • System should have appropriate nebulizer with port to connect O2 gas line (for Organic solvent aspiration) or Argon dilution accessory. • System should have high precision peristaltic pump with at least 3-4 channels and 10-12 rollers. • System introduction system assembly should be easily accessible for maintenance. • System introduction system should have very low dead volume with low uptake rate (0.25 ml/min or better). • System should be equipped with MFC/Electronic flow controllers for precise control of Plasma,

		Nebulizer, auxiliary, carrier and Make- up/dilution variable gas flow rate. Total 4 MFC/electronic flow controllers to quote. **Ion Source and Plasma:** • Computer controlled RF generator operating at 27 MHz/40MHz or suitable from 0.6 to 1.6 KW for automatic control and torch ignition, shutdown and system warm up. • RF coil or suitable coil technology should be quoted with at least 5 years typical life. • System should have digitally driven and programmable plasma generator, with auto tuning features. • System should have capability of Automatic shutdown of the plasma by the system after completion of analysis • The plasma should be fully controlled through PC of Horizontal, Vertical and sampling depth for maximum sensitivity and minimum poly atomic interference. **Plasma Torch:** • 1-2 piece quartz torch with automatic alignment. • Computer controlled adjustment of torch position (X, Y and Z directions) with independent movements. **Ion Extraction Interface:** • System should have suitable water-cooled interface. • Ni Sample, skimmer cones/extraction to be offered as standards along with system and that should be easily mountable/ dismountable without venting out the system. • Universal cone interface to analyse all type of sensitive and high matrix samples without any hardware changeover to achieve full sensitivity, detection limit, oxide ratio of quoted. **System Basic Design:** • System should be bench top model. • System should have scanning ion transmission Quadrupole. **Ion focusing System:** • Capable of removing all neutrals and photons from the ion path without causing any damage to the optics. • Should be capable of minimizing interface background. **Quadrupole System:** • Quadrupole material: made of molybdenum or stainless-steel rods or Gold or suitable material. • System should have Mass shift or mass filter mode in reaction cell technology. • The mass range should be from 2-260 amu or better. • Scan speed: 3000 amu/s or better • Dwell time/Integration time100 us. • Background equivalent concentration should be less than 1cps.

		System Detector: • EMT detector (dynode type) with both Analogue and Pulse mode. • Should be able to operate in dual mode • System should have fastest data acquisition in between 20,000- 70,000 data points/sec. **Dynamic Range:** • System should have true linear dynamic range of 10 Order or more without and hardware interchange or software adjustment to addresses varied concentrations (1%-PPT) in single aspiration. **Vacuum System:** • Suitable vacuum system with turbo and rotary pump. • System should consist of vacuum isolation between first and second stage of vacuum. • The pump should be fume and acoustic free system. **Cell Technology:** • System should have collision and reaction cell to remove poly atomic and isobaric interference. • System should operate in collision and reaction mode simultaneously. • Factory integrated line and s/w controlled MFC/electronic flow controller for collision gas, He should be offered • Separate factory integrated gas line along with MFC/Electronic Flow Controller should be quoted for future up-gradation of collision & Reaction Gas H_2/O_2 or any other gas as per the system suitability and application requirement. **IQ/OQ:** • Detection limit: Low mass: 1 ppt or better Mid mass : 0.5 ppt or better High Mass : 0.5 ppt or better Oxide ratio(CeO/Ce):<2.5% • Sensitivity: Low mass : 6 mcps/ppm or better Mid mass : 100 mcps/ppm or better High mass: 80 mcps/ppm or better Short time stability of <3% and long-term stability of <3%shal be demonstrated Doubly charged ratio: $Ce2-^{+}/Ce$ (%) :<3% Isotope ratio precision: Ag107/Ag109<0.5 Abundance sensitivity (at Cs) Low mass side: ≤ $1/5 \times 10^{-6}$ & High mass side: ≤$1/5 \times 10^{-7}$ It shall possible to measure major and minor concentrations in a single analytical run without changing any hardware. Auto tune facility to optimize plasma conditions, lens and cell voltage, etc. for best ionization and sensitivity. System should have the latest maintenance and all the vendors are requested to give maintenance component list. **Software:** • Windows based software and computer as per requirement. • User-friendly software that guides user through

		method and sequence development, and method templates for rapid development of commonly used methods. • Quantitate analytes on any possible combination of isotopes. • Editable interference correction equations • Calibration for multi-element external calibration, method of standard additions, and isotope ratios. Editable auto sampler rack and tube position Fully automated instrument initialization (Start-up) routine, including instrument stabilization time, plasma X/Y position adjustment, mass calibration, and quadrupole resolution • Simultaneous real-time graphical display of signal as full mass scan, segment of mass scan, signal response vs time for multiple isotopes or ratios **Essential Accessories** • Three no. Plasma Torch, Spray Chamber and Nebulizer for routine application • Two sets of Ni sampler and skimmer cones, for high matrix and higher sensitivity. • All required pump tubing's 40-50 Nos (each), Sample, ISTD and Drain. • Re-circulating chillers with coolant approx. 50 lts. • Auto-sampler with 50-100 positions with approx. 250 nos sample tubes, wash/ rinse bottles min 5 nos. • Required exhaust system as appropriate to the ICPMS. • Provide a maintenance chart for all of the components in the system • Any local ancillary instrument/equipment necessary to run the system, in addition to the above, should also be indicated. • Tuning standard. • NIST certified multi element standard with min 20 elements to quote min 100ml. • Rotary Pump oil Min 10 ltr. • Suitable sample introduction system comprising of torch, Pt cones (sampler and skimmer), MFC/ Electronic controller for O2+Ar introduction and all requisites for direct injection of samples in organic solvents (DMSO, IPA, CH3OHetc). • Additional software for offline analysis of data to offer **Hyphenation with HPLC for speciation studies of As, Hg etc.** System should be hyphenated with Suitable HPLC system having up to 600-1200 bar pressure, Auto-sampler (100 vials or more) and 4 nos. each of appropriate columns for speciation. **Microwave Digestion system** Microwave acid digestion system for preparation of sample eg food, tea, water, etc for elemental analysis. - Lightweight 12 position or more Teflon turntable. Easy to handle and clean. - Vessel size: 75 ml or more, corrosion proof, contamination

		free. Reaction Vessels should be made up of PTFE/ TFM material and outer vessels should be made up of composite material (peek/ceramic) - The minimum microwave output power should be 1600 Watt or more with ±1 watt increment. - Technology for faster cooling - Rugged design to withstand high pressure and acid resistant polymer shell. - Easily programmable. Can run single or more sample simultaneously with ability to programme individual vessel. - LED display - having safety features (door, leak, temp.) - Working /operating pressure should be minimum 60 - 100 bar. - Working /operating temperature should be minimum 260°C or more. - Consumable items should be quoted for trouble free run for 5 years & it contains vessel liner, cover, etc. **Computer platform** Hi end workstation PC, i7/i9 processor or higher with 64 GB DDR4 Memory, up to 16 TB SATA hard drive (7200 RPM), DVD-RW, USB port, 27" LCD Monitor with suitable Operating System and LaserJet color printer with back-to-back printing with scanner. MS Office needs to be included. **Gas cylinders** Suitable gas cylinders (UHP) of 3 Nos each with all accessories such as Exhaust system, stainless-steel double stage regulator, gas purification panel unit, gas purification cartridges, cylinder cage or bracket etc should be supplied and commissioned. The gas lining panel work should be done by the supplier for the connection of equipment. **Uninterrupted Power Supply (UPS)** 20 KVA online UPS with power factor correction and harmonic distortion for the smooth running of ICP-MS, nitrogen generator, PC with battery for back up to 3 hrs. **Warranty** Three years warranty with additional CMC quote of 4th & 5th years for ICP-MS, LC system, Microwave Digestion system, operating software, UPS including all spares & batteries, accessories and consumables, computer, printer, at least one Preventive maintenance along with PM kit in each year and unlimited breakdown visits. Should have a good after sales service/technical support capable of reaching at short notice and should attend immediately without fail. **Experience** The supplier should have experience of at least 20 successful installations (at least 10 at food testing labs) and operating GC-MS/MS in India**.**

		Training Training has to be provided free of cost during the installation and commissioning of the equipment for a period not less than 7 days. Trouble shooting training as and when required. The application support has to be provided by the company for the development of method and analysis of sample for which the GC- MS/MS instrument purchased at customer site. Validation and IQ/OQ/PQ documents for both GC modules and MS components, the Installation Qualification, Operational qualification and Performance Qualification of the instrument (GC and MS) has to be performed at the time of installation. The operational and performance qualification of the instrument has to be performed at least once in a year or after major breakdown of instrument. The job will be done free of cost during warranty period. At the time of supply of the instrument the IQ/OQ/PQ documents in soft and hard copies and essential validation kits for LC and MS has to be supplied free of cost. **Other Conditions** Model & year of introduction of the Instrument should be mentioned in the tender along with original brochures/catalogues.
4	**Homogenizer**	**Technical Specification** Multi-Prep Rapid Homogenizer **Processing Range**: 250 µL to 30 mL **Power Rating**: 150 Watts **Generator Probes**: 10 mm Stainless **Timer**: 0 to 10 minutes **Speed Control**: 500 to 30,000 rpm **Capacity:** 6 samples **Probe:** 8 nos. of 10 mm Stainless to be provided **Warranty** Three years warranty with additional CMC quote of 4th & 5th years and unlimited breakdown visits. Should have a good after sales service/technical support capable of reaching at short notice and should attend immediately without fail.
5	**UV-Vis Spectrophotometer**	**Technical Specification** • Dual beam UV-Vis spectrophotometer required with central PC control using Windows based user interface • Full wavelength range of the instrument to be covered using a single light source. Preferably High Throughput XENON LAMP, life of lamp > 8 years • SCAN speed should be very high.>20000 nm/min preferable. • Czerny-Turner Monochromator • Wave length Range: 190-1100nm • 1.5nm or better spectral bandwidth • Supplied with Scanning quantitative analysis facility-oriented software • Room light immunity to analysis • Solid sample holder attachment & other accessories • Upgradable to Solid sample attachments/ Peltier/ Microvolume measurement attachment

		Warranty Standard warranty. Should have a good after sales service/technical support capable of reaching at short notice and should attend immediately without fail.

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Annexure – B

Specifications of Equipment (Location: TLabs, Kolkata)

Sl. No.	Item	Specifications
1	**LC-MS/MS (Triple Quadrupole)**	**Core Specification**
		• The Liquid Chromatograph and Mass spectrometer and all Ion Sources must be manufactured, supplied, and installed by a single/same vendor to provide seamless integration between the LC and MS.
		• Both the Liquid Chromatograph and Mass Spectrometer must be fully supported by the supplier to provide a seamless instrument diagnostic between the LC and MS.
		Triple Quadrupole Mass Spectrometer System Specification
		• A High Sensitivity Triple Quadrupole LC-MS/MS system with a Ultra High-Performance Liquid Chromatography system as a front end for high sensitivity trace level quantitative analysis with complete software control.
		• Ionization Source: Dedicated Electrospray ionization (ESI) for high-sensitivity MS that uses superheated nitrogen to improve droplet desolvation and ion generation, for a stronger signal and reduced noise.
		• Facility to Vacuum lock should be available which should facilitate the cleaning of capillary or desolvation line without breaking the vacuum.
		• The Desolvation temperature must be a minimum of 400^0 C or above.
		• Mass Range: **5-2000 m/z or more**. This system should be able to cover a variety of applications from Food, antibiotics, Pesticides, PFAS, metabolites, Proteins, Toxins, etc
		• Facility to divert the flow to MS and to waste directly from the software should be there. It should be programmable and controlled using the software.
		• Quadrupole Heating should be available in the system.
		• Scan Speed: should have a scan speed of 18000 da/sec or better
		• Resolution: Better than or equal to 0.7 ± 0.1 amu
		• MRM Sensitivity (ESI +ve): **S/N > 800,000:1 for 1pg of reserpine** on column Injection (transition m/z 609 to 195). Sensitivity is to be demonstrated on-site during installation.
		• MRM Sensitivity (ESI -ve): **S/N > 800,000:1 for 1pg of Chloramphenicol** on column Injection (transition m/z 321 to 152). Sensitivity is to be demonstrated on-site during installation.
		• Instrument Detection Limit: The system should have an IDL of 4fg for 10fg injection in both positive and negative modes. The

		value should be mentioned in the data sheet.
		• Dynamic Range: 6 orders of dynamic range or better
		• Dwell time 0.5 msec or better
		• 500 MRM data points per second to be monitored in a single acquisition or higher
		• Polarity switching < 25ms or better
		• Detector: EMT/Equivalent detector should have the highest sensitivity for a longer time
		• Must have an Integrated Auto-Tuning/Calibration device without the requirement for any extra infusion pumps.
		• Scan Modes: The following scan modes should be available: -
		○ MS scanning
		○ Selected ion monitoring/recording (SIM/SIR)
		○ Product ion scanning/Precursor ion scanning
		○ Neutral loss/gain scanning
		○ Multiple reaction monitoring
		○ Advanced scan modes - Additional scan modes are preferred
		Fast Liquid Chromatography HPLC System: A liquid chromatography system as an inlet to the Mass spectrometer with the following specifications
		• A Binary operating pump with a maximum operating pressure of 18000 psi or better with built-in degassers should be present. The Pump's flow precision should be < 0.07% RSD. The delay Volume of the system should be less than 80 µL is must.
		• The flow rate range should be 0.001 – 5 mL/min,
		• The chromatography system should be capable of being operated both as an HPLC & UHPLC by interchanging the column and should be capable of using up to sub-2-micron columns.
		• Auto sampler should be with a capacity of approx. 110 vials of 1.5 ml or more. Sample cooler facility to be available from 4-40 deg C, with built-in sample cooling device.
		• Programmable injection ranges from 0.1 ul to 20 ul or better with customized advanced step injections is a must.
		• Injection Precision should be <0.25 % RSD or better
		• Column temperature should be up to 50°C with accuracy: +/- 0.5 ºC or better with the Capacity to hold a minimum of 2 columns of 300 mm in length each.
		Software Capabilities:
		• The software should have the full-fledged capability to calculate system suitability parameters, both for MSMS as well as fast LC
		• The software should be capable of multitasking with a single-point control over the system. Capable of performing automated calibration, extracting mass spectra, and retention time of an

		and quantitative estimation.
		• The software should be capable of making isolation windows based on retention time to improve data quality and sensitivity automatically.
		• An Acquisition mode that combines MRM with the generation of a product ion spectrum which can then be used for library identification and confirmation which would decrease analysis time increase throughput and allows for fast, sensitive, quantitative, and qualitative analysis on a single instrument, in a single analytical run. It should be able to collect at least 8-10 transitions for each precursor molecule upon a user-specified threshold.
		• A software should be quoted that assists with the development of methods from scratch or for further optimization of existing methods. It should be able to quickly determine analyte MRM transitions and optimal parameters
		• The system hardware must be augmented by powerful and sophisticated onboard instrument intelligence features such as:
		○ *The status of critical components must be reported by a dashboard to prepare for and anticipate downtime.*
		○ *The system should incorporate a secondary reinjection logic that encompasses functions such as carryover detection, detection above the upper LOQ (Limit of Quantification), and fast screening capabilities.*
		○ *An integrated automated/guided approach is expected to be provided, with the objective of expediting the fine-tuning and development of methods.*
		• It should encompass the utilization of artificial intelligence - PSO for the purpose of exploring the multidimensional parameter space for the best optimization of the system.
		Accessories
		• Nitrogen gas generator with in-built compressor: A suitable **noise-free** gas generator with an inbuilt compressor, filters, or any other accessory required for the functioning of the system. • Two nos UHP Nitrogen cylinders (7 cc) to be provided.
		• Instrument calibration standards, Vacuum Pump Oil, Tuning solution, etc. to be provided.
		Computer, Printer, etc.
		• High End Workstation PC to be provided with the system.
		Warranty
		• A comprehensive **3 yrs warranty with PM & OQ** on the entire system should be there. CMC for the 4^{th} & 5^{th} Year to be quoted.
		• Instrument and Software should be quoted with IQ & OQ • Equipment & software familiarization after installation to be done with our chemists.

		Consumables for Smooth Running of System • Vials, septa with caps; 1.5-2ml – 2000 No. • Capillary Tube/ Desolvation Line/ Cone/ declustering device – 1 No. • Syringe PTFE Filter, 13mm – 500 No. s • Vial Insert, 250 uL – 200 No. s • Nitrogen Filters – 2 No. S • Tuning Solution – 2 No. S • Vacuum Pump Oil – 2 No. S • Four Columns (2 nos C_{18} and 2 nos HILIC) for Pesticide analysis with Guard columns as applicable. • Instrument should be capable of analyzing polar pesticides (Glyphosate, Glufosinate and Paraquat) directly and necessary kit as well as column to be provided along with the equipment. • PFC free kit for PFAS application (column & other items as necessary to make system ready).
2	**GC-MS/MS (Triple Quadrupole)**	A Gas Chromatograph Triple quadrupole mass spectrometer should be able to cover the following applications: Nitrosamines, Pesticide Residue, Solvent testing, contaminant studies, Volatiles testing. Column Oven can accommodate two columns with a maximum temperature range of up to 450 °C with a set point resolution of 0.1 ° C. It should support ~20 Oven ramps & maximum temperature ramp rates of 120° C/min or more. • Cooldown of Oven from 400° to 50° in less than 4 minutes. • It should have a retention time locking facility. • It should have a touchscreen interface built into the system with USB access. • Intelligent features like EMF, etc. should be built into the system. • It should have back flush technology in build. • Retention time locking feature without using any external calibrants must be available. If any external calibrants are needed, the vendor must provide at least 100 vials of the standard. Inlet 1: PTV or Equivalent Inlet • An Inlet providing the flexibility of a standard split/Splitless inlet, along with a programmable temperature vaporizer (PTV) capability/ Equivalent, enabling large-volume injections should be provided. It should be equipped with EPC with a pressure range of 0.1 to 100 psi. • The same inlet should also support cool injections for an improved signal response. • Temperature programming of up to 3 ramps or more at up to 800 °C/min or higher with fully EPC /equivalent. • Split ratio of 12000:1 or more. • Following injection modes should be made available: a. Hot or cold split/Splitless

		b. Pulsed split/Splitless c. Solvent vent d. Direct (any other extra injection modes apart from this Inlet 2: Split/Splitless Inlet. • Auto Sampler with 150 or more vials • Area Reproducibility better than 0.5% RSD • Syringe up to 10uL as standard or better • Vial size: 2mL • A GCMSMS system with EI mode ion sources. • EI source with up to 350-degree C or better. • A self-cleaning source must be available with the system. In case a self-cleaning module is not available, the vendor must quote a spare ion source to use while cool down and cleaning of existing source. • Electron energy up to 200 eV or higher • The mass resolution of Unit Mass • Dynamic Range: 6 orders or more • A heated quadrupole with a temp of up to 200 Deg C must be provided. • If a heated quadrupole is not present, the vendor must supply an extra Quadrupole • From 10 to 1000 amu or better • A scan rate of 20000 amu/sec or better • EI MRM sensitivity 20,000:1 or higher, by 1 microliter injection of 100fg/ul OFN standard scanning from 50 to 300 amu at nominal 272 -> 222 (performed on 30m column) • 0.5 fg or better with injections of OFN with both quads set to unit resolution mode (Octafluoronaphthalene) (performed on 30m column) • It should Monitor GC and MS resources: injection counter, operation times, and electronic logs to aid planned maintenance. • It should have convenient access to pertinent consumables part numbers. • It should have the facility for rapid venting of the MS • It should have an Eco-Friendly Operation with User-scheduled sleep/wake mode to save carrier gas and power • There should be a touchscreen display on GC Instrument. • It should have a touchscreen interface built into the system with USB access. • It should have integrated Calculators like a Vapor volume calculator, solvent vent calculator, method translator, etc. • Full scan, SIM, MRM, dynamic MRM, targeted MRM, and any other scan modes • The complete system should be supplied with a computer and a printer with original software with a license to control GCMSMS and other accessories. should be operated from the main chromatography

		data handling software and integrated with it. • The quoted PC should have 16GB RAM, i5 Processor and 500GB HDD. • Latest version of NIST library should be quoted along with the system. • A triple-axis detector with high energy dynode technology for the long life of electron multiplier (EM), for any other technology a separate EM horn is to be supplied to ensure the long life of the system. Below are items that must be supplied with the system as optional: 1. Autosampler vials with caps: 1000 Nos 2. Autosampler syringe - 5 No. 3. Septa: 20 Nos 4. Ferrules: 10 Nos 5. Liner: 2 Nos 6. Filament: 1 No 7. Helium Trap: 1 No 8. Vacuum Pump Fluid: 1 L 9. O-ring: 10 (if not already included in Liner) 10. Column nut and MS interface nut: 04 each 11. MSD installation tool 12. Column block nut 2 nos • The latest edition of NIST is to be supplied with the system. • A pesticide and environmental pollutants MRM database with more than 1000+ compounds should be quoted. • The vendor should arrange for cylinders (N2, H2, Zero Air & Helium each qty-1) as applicable. • IQ & OQ should be quoted by the vendor. • It is the Vendor's responsibility to help with Method implementation help with mass transition data base. • A 3 Year warranty covering the GC-MS/MS and accessories. CMC for the 4th & 5th Year to be quoted. • Equipment & software familiarization after installation to be done with our chemists.

3	**UHPLC**	Desired Specifications · Should be capable of operating with 4 Solvents at a time during gradient operation · Settable Flow range: 0.1 – 2 mL/min, · Flow accuracy: ± 1 % · Flow Precision: RSD < 0.1 % or better · Pumping System: Software controlled · Maximum Pressure: 18500 Psi or better. · Delay volume: 400ul or below · pH range : 1 to 12.5 · Composition range : 0 – 100% · Composition precision: < 0.15 % RSD · Degasser : Integrated or separate if not integrated. · Leak sensor should be Present. · Must have a capacity to hold 100 samples or more in approx. 2.0 ml vial · With auto dilution, auto addition, premixing and needle rinsing programs. · Injection Volume Range: 0.1uL to 20 uL. · Max. Operating pressure: Same as pump. Should not be less than pump. · Auto sampler carryover: < 0.04 % RSD or better · Sample Delivery Precision: < 0.25% RSD or better · Cycle time < 18 seconds · Sampler Thermostat : 4 to 40 degrees. · Must hold 2 long 30cm columns or 8 Short 10cm columns. · Temperature range : ambient to 80°C · Wavelength range should be 190 – 600 nm or more. · Detection type should be with 1024 element photodiode array or better. · Light source - Deuterium and tungsten lamps. · Data rate should be up to 120 Hz (points/sec) or better · Wavelength accuracy = ± 1 nm. · Flow cell- Standard: 1.0 µL volume, 10 mm cell path length · Noise : < 3 x 10-6 AU · Drift: < 0.6 x 10-3 AU/Hr · Flow cell volume : 1 uL · Linearity : Up to 2 AU (5%) · Peak Purity analysis · 8 Wavelength capturing capability in one run. · Light source: Xenon lamp Longer Life · Excitation Wavelength range: 200 nm - 1200 nm or better · Emission Wavelength Range: 200 nm - 1200 nm or better · Spectral bandwidth: 20 nm · Wavelength accuracy: ± 3 nm or better

		· Wavelength repeatability: ± 0.2 nm or better · Signal to Noise ratio for Water Raman peak should be > 3000. · Flow cell volume: 8 uL · Data rate : 70Hz or better A comprehensive 3 yrs warranty with PM & OQ on the entire system should be there. CMC for the 4th & 5th Year to be quoted. Instrument and Software should be quoted with IQ & OQ • Vials, septa with caps; 1.5-2ml – 2000 No. • Four Columns (2 nos C18 and 2 nos HILIC) for Pesticide analysis with Guard columns as applicable. • PTFE syringe filter-500 • Solvent bottle-4 nos (1 should be amber) • Equipment & software familiarization after installation to be done with our chemists.
4	Homogenizer	Instrument design: Efficient & Economical, process volume: 0.05 up to 250 ml or more, instrument maximum Tip speed design: up to max. 26 m/s, Aggregate specification: Note more than 12mm Dispersing aggregate of Easy clean design, Length: 110- 130 mm, Working volume: 2-250ml, Max Tip speed: 14m/s or more, RPM: 500 to 30000 rpm or more, Drive coupling connection: Aggregates with E coupling, Noise level (without aggregate): 66 dB (A) at 25000rpm & 72 dB (A) at 30000rpm or less, Motor should be universal, Motor power: ≥500W, Drive power requirement: 90-230V ±10%, 50Hz/60Hz, operation temperature: 0-40°C, Protection class: IP 20, Drive unit connect with stand and holder should be vertically and the drive unit's height can be adjusted. For more security, the drive unit cannot be adjusted horizontally. Drive unit weight not beyond 1800g. Safety standard: EMC standards. Instrument warranty: 3 yrs standard warranty

5	Crude Fiber Extractor	• Automatic Four Place PC Compatible Autosequencing Fibre Estimation System for determination of Crude fibre, NDF, ADF, ADL, Cellulose, Hemicelluloses, Lignin, • Ceramic Infrared Heater. • Sample Size : 0.1 to 4 gms (depending on type of samples) • TFT Graphic Touch Screen Display with unique wireless mouse to operate at a distance of 1-2 mtrs without connecting to PC. • Should have 3 Ports in the motherboard one for PC connectivity 2nd port for direct connection to wireless Remote Mouse& 3rd port to connect external wireless keyboard. • Integrated autosequencing time/temperature domain of 100 programs and 12 sequencing steps or better. • Live Graph representation with Time temp curve in touch screen display • Temperature Range: Ambient to 500º C (Continuously variable), Temperature Accuracy / Precision : + 0.5° C or better. • Temperature Controller should be isolated separately in a control tower to protect electronics from heat zone and acid reaction zonewith separate access door for main unit & electronics control tower unit. • Inbuilt Machine management Software enables multi user login feature with superior admin password with multi user password for minimum 10 users. • Unique driver software to link Touch screen controller to Data processing system. All parameters of the touch screen can be read in the PC / Laptop • Measuring Range: 0.1 to 100% • Repeatability : ±1 % relative at 5% - 30% fibre level • Reagent Preheating time: 15 - 20 min • Sintered Silica glass Crucible with P1 Porosity disc (4 Nos.) • Preheating hot plate for acid / alkali made of Casted aluminium alloy heater with Digital PID Control • Power failure mode : In event of power resumption, holds previous programmed setting in memory & on power resumption starts from last & set value • Electrical Requirement: 220v/50Hz. AC Mains. • The company should be reputed with atleast 50 users in India using Automatic Fibre Estimation System with proof of User list • The instrument shall strictly confirm to the specifications with relevant brochure & Photograph with images. • The company should have proof of atleast 25 installations of long term users using equipments for more than a period of 10 -15 years showing longevity of operations • Equipment & software familiarization after installation to be done with our chemists.

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