

TECHNICAL DATA SPECIFICATIONS

To facilitate a fair and accurate technical comparison of different proposals, tenderer should complete tables provided in this document for the items they tender for.

Where the space provided is insufficient, tenderer may attach separate pages but it must be indicated clearly in the table that extra information is to be found elsewhere.

Supplementary technical information besides those asked for in the table may also be provided if they are expected to be useful for tender evaluation.

Relevant product brochures should be submitted together with Technical Data Information.

IMPORTANT: Information not furnished in the table provided or not attached as required will be assumed to be unavailable or unsupported or not applicable, even if such information can be found in the brochure.

Please fill in accordingly and tick in the appropriate box

Item: High Performance Liquid chromatography–mass spectrometry System (HPLC-MS)

Quantity: One (1) Complete Set

General Information

Tenderer :

Manufacturer :

Product Model :

Delivery Leadtime :

Incoterms (2010) : DDP (NTU, Singapore)

Required Specifications	Specifications Provided By Supplier	Comply?	
1. High-pressure solvent delivery system requirements:		YES	NO
Should be equipped with a binary pump system that allows concurrent utilization of two solvent lines from analytical to preparative scale.		[]	[]
Should be a high pressure mixing pump that could deliver flow rate of 0.50 to at least 100.00 mL/min with a minimum of 0.01 mL/min flow rate increment.		[]	[]
Could deliver flow accuracy of $\pm 1.0\%$.		[]	[]

Could accommodate up to four solvents line.		[]	[]
Offers an operating pressure range that covers at least 0 – 400 bar.		[]	[]
Delay volume of ≤ 350 uL.		[]	[]
Composition accuracy of $\pm 1.0\%$.		[]	[]
Composition precision of $<0.3\%$ Relative Standard Deviation (RSD) or 0.1 min Standard Deviation (SD), whichever is greater.		[]	[]
Must be compatible for columns of up to 50mm diameter.		[]	[]
Must be equipped with leak sensing ability.		[]	[]
2. Autosampler/Fraction collector requirements:			
Allows the sampling and fraction collection for analytical scale analysis as well as preparative scale purification.		[]	[]
Analytical and preparative injection valves must be independent.		[]	[]
Syringe delivery accuracy of more than 99.0% at full stroke.			
Injection reproducibility should be less than 0.75% Relative Standard Deviation (RSD).		[]	[]
Should withstand pressure of at least 400 bar.		[]	[]
Could accommodate sample loops with injection volumes from at least 5uL to at least 8 mL.		[]	[]
The sample loop is upgradeable to up to 10 mL. Each wash cycle should complete in less than 30s.		[]	[]
Wash station should support at least 2 wash solvent ports.		[]	[]
At least two sample loops of 20 uL and 1 mL should be included.		[]	[]
Unit should at least include 2-mL vial injection rack capable of holding at least 100 2 mL vials as well as 13mm falcon tube collection rack capable of holding at least 100 tubes.		[]	[]

Sample and collection rack must be independent.		☐	☐
Users should be able to control the fraction collection mode, which could be time-based, threshold-based, slope-based, mass-based or of a mixed trigger. Allows waste collection and secondary triggering (to detect waste) to safeguard samples.		☐	☐
Injections can be made from any location on the bed and from any racks.		☐	☐
3. Auxiliary flow controller requirements:			
Allows independent control analytical and preparative flow paths.		☐	☐
Allows control of at least 2 analytical and 2 preparative columns.		☐	☐
Supports flow splitting for mass spectrometer.		☐	☐
Provide options to upgrade for automatic injection of solvent modifiers.		☐	☐
Provide options to upgrade for column dilution to diminish effects of mixing organics with aqueous phase.		☐	☐
Should include optional system leak sensing capability.		☐	☐
4. Wavelength Detector requirements:			
Able to monitor at least 2 specific wavelengths in the range of 190nm to 600nm simultaneously during a single analysis without loss in sensitivity.		☐	☐
Wavelength accuracy of at least ± 1 nm.		☐	☐
Short-term noise of $< \pm 7 \mu\text{AU}/\text{cm}$ with 10 mm path length cartridge cell.		☐	☐
Linear range that does not deviate by more than five percent (5%) up to 2.5AU.		☐	☐
Should at least include: - 10mm path length analytical flow cell that can withstand up to 100ml/min flow rate.		☐	☐

- 3mm path length semi- preparative flow cell that can withstand up to 100ml/min flow rate. - 1mm path length preparative flow cell that can withstand up to 100ml/min flow rate.			
5. High Performance Liquid Chromatography Columns requirements			
Consists of at least two analytical scale reversed-phase columns.		[]	[]
Consists of at least one reversed-phase preparative scale column with respective guard cartridge and cartridge holder.		[]	[]
The columns are to provide maximum method development flexibility and enables seamless method transfer of analytical to preparative liquid chromatography (direct scalability).		[]	[]
The length of all three columns should be identical and less than 120 mm.		[]	[]
The internal diameter (i.d.) of the analytical columns should be 4.6 mm while that of the preparative column should be within 19-22 mm.		[]	[]
The packing materials of all columns and preparative guard cartridge should be identical, with the following features: 1. The particle size (dp) should be 5 μm . 2. The pore size should be 130Å. The column particles should be of C18 chemistry and able to withstand pH 1-12.		[]	[]
The guard cartridge for preparative scale column should be 10 mm in length.		[]	[]
The cartridge holder should fit the internal diameter of preparative column and length of the guard cartridge.		[]	[]
6. Single quadrupole mass spectrometer requirements			

The mass spectrometer should be a bench top model with Electrospray Ionization (ESI) source and compatible with the liquid chromatography system above.		[]	[]
Suitable for peptide and oligonucleotide samples.		[]	[]
The mass range should at least be 30-1200 m/z.		[]	[]
Scan speed of at least up to 10,000 Da/s.		[]	[]
Able to perform full-scan mass analysis or selected ion monitoring.		[]	[]
The mass drift must not exceed 0.1Da over a 24 hr period.		[]	[]
The mass accuracy must be better than +/- 0.2 Da over full mass range.		[]	[]
The scan speed should be automatically-optimized for enhanced data quality for acquisition rates up to 20 Hz.		[]	[]
The linearity of range of response relative to sample concentration for a specific compound is up to four magnitude from the limit of detection.		[]	[]
The ion polarity switching time must be 30 ms or shorter between positive and negative ion modes.		[]	[]
The acquisition rate for single ion monitoring mode should be automatically-optimized for enhanced data quality for acquisition rates up to 100 Hz.		[]	[]
There must be at least up to 1024 single ion recording (SIR) channels which can be monitored in a single acquisition.		[]	[]
There must be automated mass resolution control of less than 0.9 Da for constant data quality.		[]	[]
The ability to run functions in a single experiment with varying cone (or equivalent) voltages.		[]	[]
The instrument must have a single method file where all parameters are set.		[]	[]

The system comes with facile shut down option when needed for power saving/maintenance, the off to ready time should be less than an hour after switching on.		☐	☐
There must be automated mass calibration and resolution verification.		☐	☐
It should have a pre-filter to maximize resolution and transmission while preventing contamination of mass analyzer.		☐	☐
The size must be smaller than or equivalent to 40cm (width) x 20cm (height) x 80cm (depth).		☐	☐
7. Computer and software:			
The computer should be supplied with minimum specification of at least 17" LCD monitor, DVD-RW, Windows 7 Professional Operating System, 64-bit, 2 TB hard disk, 2 GB RAM.		☐	☐
Software should allow automated fraction collection based on desired parameters as well as tracking of samples and fractions in an easy-to-view format.		☐	☐
Allows collection of peaks that are not of primary concern but that are not classified as waste.		☐	☐
Allows waste collection.		☐	☐
Must allow automatic screen of samples to determine the preparative strategy in an analytical-scale separation, then choose an appropriate method for each sample in a batch and purify it and screen fractions to determine the next process step.		☐	☐
Able to perform mass spectrometry data review through fractions tracked and tube purity determination.		☐	☐
Must have the flexibility to provide manual review and override.		☐	☐
Able to perform automatic rationalization of MS spectra of		☐	☐

multiply-charged species such as peptides, containing product ions in a range of different charge states.			
Plotting the complex peptide MS spectra containing fragment ions in multiple charge states into homogenous (virtual Z=1) charge state representation.		[]	[]
Allows control across multiple columns.		[]	[]
Software could monitor solvent levels and gives solvent level alarms.		[]	[]
Allows automated mass calibration, mass resolution.		[]	[]
Allows automated diagnostics, checks and alerts.		[]	[]
8. Other requirements:			
Includes installation and commissioning of the set of high performance liquid chromatography, including the binary high-pressure solvent delivery system, autosampler/fraction collector, auxiliary flow controller, wavelength detector.		[]	[]
It should also include the installation and commissioning of single quadrupole mass detector and its connection to the HPLC system.		[]	[]
One year standard warranty includes parts and labour.		[]	[]
On-site training after installation of instrument.		[]	[]
Option to purchase To provide 1st, 2nd, 3rd, 4th, and 5th year preventive maintenance after expiration of warranty. Refer to Annex B and to fill in the option to purchase in the PM cost schedule provided together in this tender.		[]	[]
To provide track record history To fill in Track record history on Table 1 provided in this document.		[]	[]

TABLE 1: TRACK RECORD OF THE SUPPLIER

This list will be used to determine the track record of the vendor. Please list down the organization that you have previously worked with.—Experiences similar to our requirements are preferred.

Name of the Company you have previous work with	Description of the purchase/ project	Date	Reference/ Contact Person	Contact No / Email