INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

MATERIALS MANAGEMENT DIVISION

Powai, Mumbai - 400076

Technical Specifications for Analytical cum Semi-Preparative High Performance Liquid Chromatography

The HPLC system shall include the following individual stackable self-contained modules.

The HPLC system must be controllable, monitored, capable of performing system maintenance using Microsoft Internet Explorer web browser. Modules should be connected via fibre optic noise resistant high-speed transmission technology to enhance the reliability & sensitivity of HPLC

1. Binary Pump for Analytical andSemi-Prep Flow Rates
2. Column Organizer with valves for automatic column switching and solvent recycling
3. Photo Diode Array Detector
4. Autosampler with Sample Cooler andManual Injector with different sample loops
5. Fraction Collector with suitable racks
6. Column Oven
7. Chromatographic Software
8. Service, Warranty & Training

1. Pump for Analytical & Semi-Preparative flow rates

- The pump should support both analysis & fractionation allowing efficient scaling up with a single instrument
- It should be high pressure binary pump with two individual flow lines
- The pump should be able to handle flow rates ranging from those used in analytical scale to those used in semi-preparative.
- It must be a parallel type double plunger in-parallel pump with automatic pulsation correction mechanism achieving pulse-free solvent delivery.
- Pump should have plunger capacity of 50ul or better
- Maximum operating pressure should be 40MPa or better
- Flow rate should be settable between 0.01mL/min to 20.00mL/minor better without any hardware changes
- Flow rate accuracy should be ±1% or ±10µl of set value whichever is larger
- Flow rate precision should not be more than ±0.1% RSD or 0.02 min SD

- The gradient formation should be produced through high pressure mixing
- It should employ active check valves that allow stable delivery of even non-polar organic solvents
- It should be supplied with Maintenance kit, reservoir tray with 4 solvent bottles, complete with fittings etc.
- It must have a leak sensor as safety feature
- Pump should be capable of mixing solvents in different proportions for entire flow rate

2. Column Organizer with Column Switching & Solvent Recycling Valve:

- Appropriate column organizer/holder with columns clamp assembly shall be supplied along with this HPLC system
- Column holder should support mounting of one column with inner diameters in the range of 20 to 50 mm, one analytical column, upto five manual selection valves of various types
- Automatic column switching valve should be provided. This column switching should be completely automatic.
- Solvent recycle assembly with all essential valves & accessories should be provided. Suitable software for solvent recycle purpose should be included with this.

3. Photodiode Array (PDA) Detector

- The wavelength range should be 190 nm - 800 nm or better
- The photo-diode array detector should have 512 or 1024 elements
- The detector should have variable slit width for high resolution as well as high sensitivity
- A Conventional flow cell of 10 µL volume& 10 mm cell path length should be available
- It should also have preparative flow cell of 0.5mm path length for semi-preparative applications
- The flow cells should be temperature controlled
- Wavelength accuracy should be ±1 nm
- A deuterium lamp [D2] and a Tungsten lamp [W] should be available as Light Source for UV and visible wavelengths respectively.
- The selection of light source should be flexible to select D2, W or both [D2 +W] the lamps for analysis
- The Drift should be smaller than $6x10^{-4}$ AU/Hour or better
- The Noise Level should be smaller than $0.8x10^{-5}$ AU or better
- Linearity should be equal or more than 2.0AU (ASTM method)
- It should have automatic wavelength accuracy check at 4 wavelengths (UV & Vis) & wavelength correction
- It should have a self-aligning mechanism for the light sources and cell.
- Light sources and cell should be accessible from the front for easy maintenance

4. Autosampler with Sample Cooler & Manual Injector with different sample loops

- Sample injection volume of Autosampler should be variable between 0.1 µl to 100µl
- Injection system should be variable injection volume type with zero sample loss during injection
- It should be able to handle 150vials of 1ml capacity or60 vials of 1.5/2 ml capacity, 40 vials of 4ml capacity.
- Flow line rinse capability both before and after sampling should be possible
- It should be capable of a carry-over no more than 0.005 %
- Injection volume accuracy within 1%
- The injection precision should be less than 0.4% of RSD value
- It should be supplied with additional sample loop of 2000ul
- It should be possible to increase autosampler capacity for high throughput analysis
- Supply of at least 100 sample vials of 1.5/2 ml capacity with caps and septa
- Autosampler should have provision of sample cooler for controlling temperature of the sample vials from 4°C to 40°C
- Rheodyne Manual Injector with different sample loop sizes of 20ul, 100ul, 500ul,1ml& 2ml should be supplied along with HPLC system.

5. Fraction Collector

- It should be possible to use fraction collector over wide range of flow rates covering small & large scale preparative work. It should adapt to applications such as manual collection while viewing chromatogram as well as advanced continuous & automated preparative separation & collection performed in combination with autosampler
- It should be possible to perform fraction simulation using HPLC software
- Even if elution time changes due to fluctuations in room temperature or composition of mobile phase, it should be possible to accurately perform fractionation by catching the target component
- Appropriate racks with vials/tubes (for 4ml&20ml) should be supplied
- Fraction Collector have below specifications

Drive System:	Arm movement X-Y system
Minimum number of fractions:	10 to 100 (depending in type of rack used)
Collection method:	Solenoid Valve or direct through nozzle
Maximum flow rate:	100 ml/min or better
Fraction Modes:	Basic mode & Time-Program mode

6. Column Oven:

- Column Oven should be block heating or forced air circulation type for uniform temperature distribution
- Temperature control range should be 10°C below ambient to 80°C
- Temperature control precision should be ± 0.1°C

- It should be possible to accommodate analytical as well as semi-preparative columns inside this column oven

7. Chromatographic Software

- Operation of the system should be very easy and intuitive via a state-of-the-art 32 bit Windows 8/10 based software
- It should cover full one-point digital instrument control, qualitative and quantitative processing, report creation and self-diagnosis
- The data can be converted to other formats. Spread Sheet software and word-processing software can be readily employed to provide data in tables or graphs through industry standard protocols
- The software should allow automatic execution of system checks, auto-purge and baseline checks

Service, Warranty and Training

1. Price should include delivery, installation, commissioning and training (at least 4 users) at supplier's location
2. On-site installation, commissioning and training shall be conducted by a qualified factory-trained engineers
3. After the first year Warranty for complete equipment for a period of at least 36 months should be provided
4. Vendor to provide service guarantee: should the system require service during the warranty period, vendor must guarantee turn-around-time within 24 hours
5. Vendor to have logistic support to ensure that over at least 95% of the service parts are readily available and upkeep delivery within 24 hours
6. Vendor to provide a copy of Site-Preparation checklist
7. Vendor must demonstrate that it has a proven appropriate set-up and capability to provide after-sales service efficiently and effectively. The supplier should have in his facility a similar system to that proposed in this tender for training purpose
8. One Analytical C-18 Column (5um, 4.6x250) & one Semi-Prep C-18 Columns (5um, 10x250) and 1 prep column (20 x 250) should be supplied along with HPLC system
9. All required kits, tubings, joints, tool kit etc. essential for running & maintenance of the system shall be supplied along with the system
10. Suitable configuration (at least i5 processor, 8GB RAM, 1 TB hard drove22 inch screen) branded Desktop PC (with Windows OS & MS Office) and suitable capacity of online UPS with at least 1 hour back-up should be supplied.