



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

MATERIALS MANAGEMENT DIVISION

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PR No.1000018443

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PR No. 1000018443 Technical Specifications for High Performance Liquid Chromatography

Supply, Delivery, Installation and Commissioning of Modular Analytical cum Semi-Preparative High Performance Liquid Chromatography System With Accessories

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 and Semi-Prep Flow Rates
2. Autosampler with Sample Cooler and Manual Injector
3. Column Oven with column switching valve
4. Photo Diode Array Detector
5. Chromatographic Software
6. Service, Warranty & Training

1. Pump for Analytical & Semi-Preparative flow rates

- 1.1 The pump should support both analysis & fractionation allowing efficient scaling up with a single instrument
- 1.2 It should be high pressure binary pump with two individual flow lines
- 1.3 The pump should be able to handle flow rates ranging from those used in analytical scale to those used in semi-preparative
- 1.4 It should be a parallel type double plunger with automatic pulsation correction mechanism achieving pulse-free solvent delivery
- 1.5 It should be supplied with rinsing pump
- 1.6 Pump should have plunger capacity of 50ul or better
- 1.7 Maximum operating pressure should be 49MPa or better
- 1.8 Both analytical as well as preparative mixer should be included with this system
- 1.9 Flow rate should be settable between 0.01mL/min to 20.00mL/min or better without any hardware changes
- 1.10 Flow rate accuracy should be $\pm 1\%$ or $\pm 10\mu\text{l}$ of set value whichever is larger
- 1.11 Flow rate precision should not be more than $\pm 0.08\%$ RSD or 0.02 min SD
- 1.12 The gradient formation should be produced through high pressure mixing

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

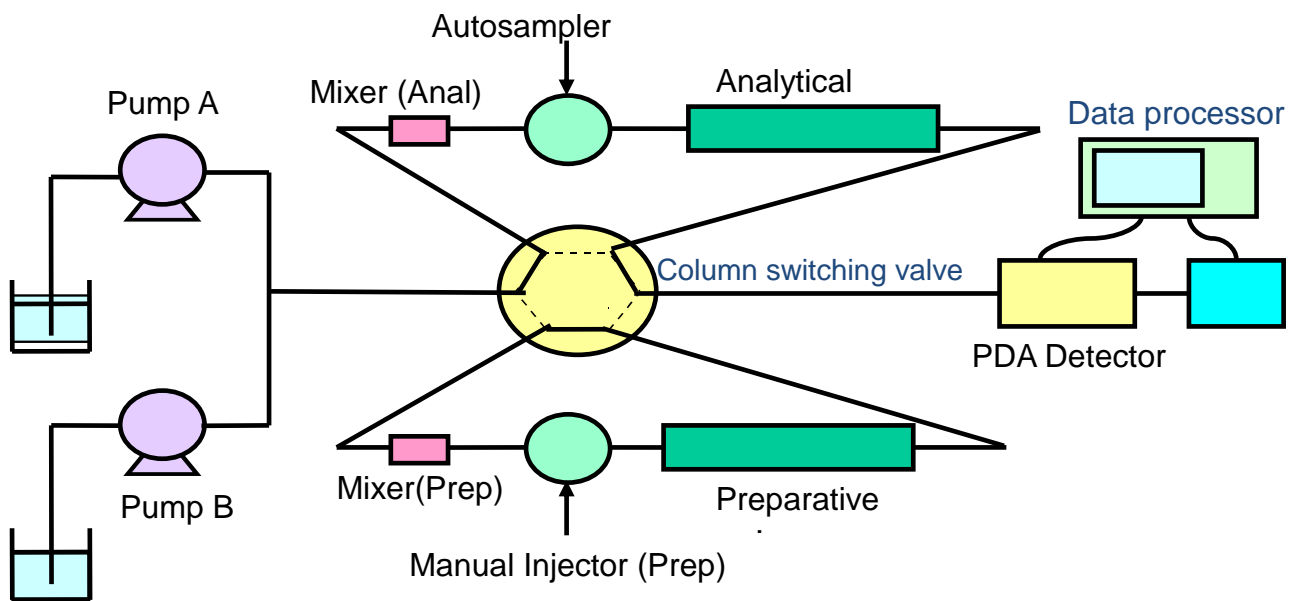
2. Autosampler with Sample Cooler & Manual Injector with different sample loops

- 2.1 Sample injection volume of Autosampler should be variable between 0.1 µl to 100µl
- 2.2 Injection system should be variable injection volume with zero sample loss during injection
- 2.3 It should be able to handle 150vials of 1ml capacity or 60 vials of 1.5/2 ml capacity, 40 vials of 4ml capacity. It should also be able to accommodate microtiter plates and deep-well plates
- 2.4 Flow line rinse capability both before and after sampling should be possible
- 2.5 It should be capable of a carry-over no more than 0.005 %
- 2.6 Injection volume accuracy within 1%
- 2.7 The injection precision should be less than 0.4% of RSD value
- 2.8 It should be supplied with additional sample loop of 2000ul
- 2.9 Supply of at least 100 sample vials of 1.5/2 ml capacity with caps and septa
- 2.10 Autosampler should have provision of sample cooler for controlling temperature of the sample vials from 4°C to 40°C
- 2.11 Rheodyne Manual Injector with different sample loop sizes of 20ul, 200ul, 1ml & 2ml should be supplied along with HPLC system

3. Column Oven:

- 3.1 Column Oven should be forced air circulation type for uniform temperature distribution
- 3.2 Temperature control range should be 4°C to 85°C
- 3.3 Temperature control precision should be ± 0.1°C (typically 0.04°C)
- 3.4 It should be possible to accommodate analytical as well as semi-preparative columns inside this column oven
- 3.5 Manual column switching valve should be provided. With this it should be possible to switch between both flow lines without physical changeover of columns, tubings, fittings

The Manual switching between analytical to semi-preparative LC system & columns should be as indicated below:



4. Photodiode Array (PDA) Detector

- 4.1 The wavelength range should be 190 nm - 800 nm or better
- 4.2 The photo-diode array detector should have 1024 elements
- 4.3 The detector should have variable slit width for high resolution as well as high sensitivity
- 4.4 A flow cell of 12 μ L volume, 10 mm cell path length & 12 MPa pressure should be available. The flow cells should be temperature controlled from 19°C to 50°C It should also have preparative flow cell of 0.5mm path length for semi-preparative applications
- 4.5 Wavelength accuracy should be ± 1 nm & wavelength resolution should be ± 0.1 nm
- 4.6 A deuterium lamp [D2] and a Tungsten lamp [W] should be available as Light Source for UV and visible wavelengths respectively.
- 4.7 The selection of light source should be flexible to select D2, W or both [D2 +W] the lamps for analysis
- 4.8 The Drift should be 0.4×10^{-3} AU/Hour or better
- 4.9 The Noise Level should be smaller than 4.5×10^{-6} AU or better
- 4.10 Linearity should be 2.5 AU
- 4.11 It should have a self-aligning mechanism for the light sources and cell
- 4.12 Light sources and cell should be accessible from the front for easy maintenance

5. Chromatographic Software

- 5.1 Operation of the system should be very easy and intuitive via a state-of-the-art 64 bit Windows' 10 based software
- 5.2 It should cover full one-point digital instrument control, qualitative and quantitative processing, report creation and self-diagnosis
- 5.3 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
- 5.4 The software should allow automatic execution of system checks, auto-purge and baseline checks

6. Service, Warranty and Training

- 6.1 Tendered price should include delivery, installation, commissioning and training (at least 4 users) at supplier's location
- 6.2 Warranty for complete equipment for a period of 36 months should be provided. This shall include the following at no extra cost:
 - Travel and Labour expenses of Customer Engineer
 - Service Parts used for repairs
- 6.3 Vendor to provide service guarantee: should the system require service during the warranty period, vendor must guarantee turn-around-time within 24 hours
- 6.4 Vendor to provide a copy of Site-Preparation checklist
- 6.5 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

- 6.6 Flow line switching from Analytical to Semi-Preparative & vice versa should be possible using manual column switching valve. Appropriate manual switching valve with required accessories should be supplied as standard with this system
- 6.7 One Analytical C-18 Column (5µm, 4.6 x 250mm) should be supplied along with this system
- 6.8 All required kits, tubings, joints, tool kit etc. essential for running & maintenance of the system shall be supplied along with the system
- 6.9 The vendor must be reputed one having experience of at least 10 Years for supply of HPLC & Preparative LC systems. They should have their own facility within Mumbai for demo / training purpose having similar instrument which has been quoted here. Vendor must have service as well as application engineers based within Mumbai city