

Specification for Analytical HPLC System and Recirculating Preparative HPLC System
for Quantum Cluster Solar Cell project.

A. Specification for Analytical HPLC System:

1. **Type** : Ultra High Performance Liquid Chromatography (UHPLC) system offering conventional and ultra high speed/high resolution analytical capabilities.
2. **Solvent Delivery System : HPLC Pump – 1 Nos.**
Ultra high pressure Quarternary Gradient Pump Low pressure system. Flow Rate setting range: 0.0001 to 10ml/min in 0.1uL/min step. Flow rate accuracy +/- 1% or +/- 0.5uL of set value whichever is larger. Flow rate precision: Less than +/-0.06% RSD. Maximum Pressure Setting: 130 MPa (<3ml/min):19,000 PSI. Standard Gradient Mixer with delay volume of 20uL.
3. **Degassing Unit : 1 Nos.**
On-line Membrane degassing unit with 5 flow lines with maximum operating flow rate upto 20 ml/min per flow line.
4. **Autosampler : 1 Nos.**
Total sample injection, variable injection volume. Injection Volume setting range:0.1 to50uL. Injection volume accuracy: +/- 1%. Injection volume precision: 0.25% RSD. Carry Over: Less than 0.0015%. Autosampler should have a cooling facility with dehumidifying function 4 deg C to 40 deg C.
No.of samples processed automatically: Random access upto 175 positions for 1ml vial volume.
5. **Column Oven : 1 Nos.**
Forced Air Circulation type with a temperature range: +4 deg C to 85 deg C in 1deg C steps. The temperature control precision should be +/- 0.01 C Max. Capacity to hold 6 X 30 cm columns. Ability to operate 10 deg C below ambient room temperature.
6. **Detector : 2 Nos.**
 - A. **Photo Diode Array (PDA) UV-VIS Detector** : designed to match UV-VIS detection sensitivity. 512 elements and an element resolution of 1.2 nm/element. Wavelength range: 190 nm to 800nm. Operates under 2 modes, high resolution mode at a slit width of 1.2 nm and high sensitivity mode at a slit width of 8 mm. Semi micro flow cell(2.5 uL volume, 5mm pathlength, 12 Mpa pressure max) with temp. control as standard. Wave length accuracy : +/- 1 nm. Noise level : Less than +/- 0.6x 10⁻⁵ AU. Linaarity: = or > 2.0 AU.
 - B. **Evaporative Light Scattering (ELS) Detector** : designed for detection of practically all components in the sample, independent of a compound's absorbance, fluorescence or electroactivity. Evaporative Zone temperature: ambient to 120 deg C. Chamber temperature: 10 deg C to 60 deg C.
Liquid flow rate: 0.2 mL /min to 5 mL. Light source 650 nm laser diode,< 5 mW.
Detector: Hermetically sealed photodiode/operational amplifier.
7. **Column : 4 Nos**
 - A. C 18 Analytical Reverse Phase Column – 1 Nos. Dimension (mm): 250X4.6 (5 micron) with Guard col.
 - B. C 8 Analytical Column Reverse Phase Column – 1 Nos. Dim.(mm) : 250 X 4.6 (5 micron) with Guard col.
 - C. Phenyl Analytical Column – 1 Nos. Dimension (mm) : 150 X 4.6 (5 micron) with Guard col.
 - D. C 18 (ODS) Analytical Reverse Phase Column – 1 Nos. Dim.(mm): 150 X 2.0 (2.2 micron) with Guard col.
8. **HPLC Software** : Necessary software package to control upto 4 LC units.
9. **HPLC Computer Hardware**: Branded computer like Dell or HP with laser printer.
10. **Warranty** : Comprehensive 2 year warranty covering all spare parts and labor.

B. Specification for Recycling Preparative HPLC System :

1. **Type** : Preparative recycling HPLC system designed to offer both analytical and preparative separation.
2. **Solvent Delivery System : HPLC Preparative Pump – 2 Nos.**
Flow rate: 0.01 to 150 ml/min. Plunger capacity: 250uL. Flow rate accuracy: Less than + or – 1 %.
Maximum discharge pressure: 42MPa (0.01 to 100 ml/min.). Gradient: high pressure upto ternary gradient operation. Concentration adjustment: 0-100%, 0.1% steps.
3. **Sampling System and Column Organizer** : Manual Injector- 2 Nos . 20uL, 100uL, 1 mL, 2mL and 5 mL Loops to be provided. With mixer – 2 Nos and Preparative Column Organizer. Recycling valve to be provided.
4. **Detector – 2 Nos.**
 - A. **Dual Wavelength UV-VIS Detector** : Wavelength 190 nm – 900 nm. And should have a preparative flow cell in addition to analytical cell. Wavelength accuracy: + or – 1 nm and wavelength reproducibility: + or – 0.1 nm. Drift : Less than 1×10^{-4} AU.
 - B. **Optional Fluorescence Detector** : Designed for high sensitivity and trace analysis under conventional and UHPLC. Light source xenon lamp. Wavelength range: 200 – 650 nm. Spectral bandwidth: 20nm. Wavelength accuracy: + or – 2 nm. Signal to Noise Ratio for Water Raman Peak: Minimum 1200. Flow Cell : 12 uL Standard and 3uL Semi-micro flowcell. Cell temperature: 4 deg C to 40 deg C.
5. **Fraction Collector – 1 Nos**
Drive system. Arm movement(X-Y) system capable of collecting upto 64 fractions.Collection method:Solenoid. Collection modes: Programmable mode, Time mode, Overlapping peak collection mode, Off-scale detector signals mode, ratio chromatogram mode.
6. **Preparative HPLC Column : 2 Nos.**
 - A. C 18 Reverse Phase Preparative Column. Dim: 250 X 20 mm.
 - B. Optional GPC Preparative Column . Dim: 300 X 19 mm – Toluene 10^3 .
7. **HPLC Software** : Necessary software package to control HPLC.
8. **HPLC Computer Hardware**: Branded computer like Dell or HP with laser printer.
9. **Warranty** : Comprehensive 2 year warranty covering all spare parts and labor.

Kindly Note: The quotation must be in a single quotation with both the system.

It must be a two bid system with technical bid and price bid in separate envelop.

It must include all installation, commissioning and training of end users.
