**Specification for Advanced Analytical HPLC System and Preparative HPLC with Recirculation System**

**for Quantum Cluster Solar Cell project.**

1. **Specification for Advanced Analytical HPLC System:**
2. **Type:** Ultra High Performance Liquid Chromatography (UHPLC) system offering conventional and ultra high speed/high resolution analytical capabilities.
3. **Solvent Delivery System: HPLC Pump – 1 Nos.**

Ultra high pressure Quaternary 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.

1. **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.

1. **Auto sampler: 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%. Auto sampler should have a cooling facility with dehumidifying function 4 deg C to 40 deg C.

 No. of samples processed automatically: Random access up to 175 positions for 1ml vial volume.

1. **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.

1. **Detector: 2 Nos.**
2. **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 path length, 12 Mpa pressure max) with temp. control as standard. Wave length accuracy: +/- 1 nm. Noise level: Less than +/- 0.6x 10-5 AU. Linearity: = or > 2.0 AU.
3. **Evaporative Light Scattering (ELS) Detector:** designed for detection of practically all components in the sample, independent of a compound’s absorbance, fluorescence or electro activity. 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.

1. **Column : 4 Nos**
2. C 18 Analytical Reverse Phase Column – 1 Nos. Dimension (mm): 250X4.6 (5 micron) with Guard col.
3. C 8 Analytical Column Reverse Phase Column – 1 Nos. Dim.(mm) : 250 X 4.6 ( 5 micron ) with Guard col.
4. Phenyl Analytical Column – 1 Nos. Dimension (mm): 150 X 4.6 (5 micron) with Guard col.
5. C 18 (ODS) Analytical Reverse Phase Column – 1 Nos. Dim.(mm): 150 X 2.0 ( 2.2 micron) with Guard col.
6. **HPLC Software**: Necessary software package to control up to 4 LC units.
7. **HPLC Computer Hardware**: Branded computer like Dell or HP with laser printer.
8. **Warranty:** Comprehensive 2 year warranty covering all spare parts and labor.

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1. **Specification for Preparative HPLC with Recirculation System** :
2. **Type** : Preparative recycling HPLC system designed to offer both analytical and preperative separation.
3. **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.

1. **Sampling System and Column Organizer :** Manual Injector- 2 Nos . 20uL, 100uL, 1 mL, 2mL and 5 mL Loops to be provided. With mixer –2 Nosand Preparative Column Organizer. Recycling valve to be provided.
2. **Detector – 2 Nos.**
3. **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 X 10-4 AU.
4. **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.

1. **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.

1. **Preparative HPLC Column** **: 2 Nos.**
2. C 18 Reverse Phase Preparative Column. Dim: 250 X 20 mm.
3. Optional GPC Preparative Column . Dim: 300 X 19 mm – Toluene 103 .
4. **HPLC Software** : Necessary software package to control HPLC.
5. **HPLC Computer Hardware**: Branded computer like Dell or HP with laser printer.
6. **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.**

 **Attach separate list of end users/installations of HPLC systems in Chennai & Tamil Nadu**

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