INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

MATERIALS MANAGEMENT DIVISION

Powai, Mumbai 400076

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Detailed Technical Specifications for Multi Angle Light Scattering System

Multi Angle Light Scattering (MALS) for *absolute* molar mass measurements along with protein separation accessories, Batch Dynamic Light Scattering Detector with capability to connect to MALS system for carrying out online DLS studies, and attached to Protein separation system (HPLC System) with UV-VIS Detector Accessories

1. Static Light Scattering Detector:

- Multi-angle, digital signal processing (DSP) light scattering detector with Programmable laser (10 - 100%)
- Laser Wavelength: ~ 600-700 nm
- **Minimum8 angle** research grade light scattering photometer for ***absolute*** molar mass determination
- Temp Control: Ambient
- **Molar Mass Range: 200 Da to 150 MDa (typical)**
- **Molecular Size Range: ~5to 300 nm**
- It should eliminates column calibration
- It should have option for *in- situ* flow cell cleaning
- Detector Resolution: 24 bit or similar
- It must determines absolute molar masses, sizes and conformations
- Compatible with all solvents (aqueous and organic)
- SEC-MALS System Readiness Monitor, Real-time Instrument Health Indicators
- It should be compatible with all HPLC
- It must be eliminating stray light
- Power input 80-260V AC, Full colour display for data at a glance.
- **Micro-cuvette assemblies must be included**

2. Inline - Filter Kit(Aqueous)

- The Filter Kit should contain all necessary parts to install an in-line filter after HPLC pump, including the filter holder.
- Helpful SEC columns in terms of reducing cleaning frequency and should improve light scattering baselines.
- 50 Nos. of 0.1 µm Durapore membranes, for aqueous separations.

3. Syringe Pump

Syringe Pump for micro-batch measurements;

Should accommodate fluids up to 50 cc or similar syringe

4. Automated Software

Chromatography based software for data collection,

a. data analysis of Static Light Scattering Data including Differential Refractive Index Measurements.
b. Should determine absolute molar mass, size, relative fractions of copolymers and conjugates.
c. Should also take UV signals for processing.
d. Determines dn/dc and also Hydrodynamic radii with Online DLS module installed.
e. Enables conformational studies through RMS studies Vs. Molar masses.
f. Facilitates customized reporting and includes standard deviation of the measurements.
g. Multiple floating licences provided in the same site.

5. Differential Refractometer with extended range for absolute refractive index determination

- RI detector with 256 times the detection power
- Should have High dynamic range
- Range : -0.005 to + 0.005 RIU; Noise: ± 7.5 x 10^{-10} RIU or similar
- Dynamic Range : 12,000,000 : 1 or comparable
- Band Broadening : < 20 µL
- Sample Temperature : 4 C to 65 C
- Measures the absolute refractive index of a solution (1.2 – 1.8 RIU)
- Should measure *dn/dc at the same wavelength*, as the LS detector.
- Should also make *absolute* refractive index determinations.
- Should have 512 or equivalent light measuring elements in one photodiode array System Readiness Monitor, Real-time Instrument Health Indicators

6. Dynamic Tight Scattering capable of online and offline (cuvette based) mode

- Laser Wavelength : ~600-700 nm; it should be programmable
- Scattering Angle : 90 degree
- Size Range Rh by DLS: 0.2 to 2500 nm
- Molar Mass by SLS : 200 Da to 1.5 MDa or similar
- Temperature Range: - 10C or below to + 100 C and above
- Sample Cells : Capable of supporting Micro Quartz Cuvette and Disposable Micro-Cuvette(~100 □l to 500□l); one smaller and one higher volume.
- Sensitivity : 0.1 mg/mL or equivalent
- Data Acquisition time : 1 to 3600 sec
- Correlator : 512 Channel, 100 nsec sampling in multi-tau Layout
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- Very well connected to MLS system for Seamless Online DLS Studies through a Compatibility Kit
- Appropriate Software for DLS Data Acquisition, Analysis and Reporting
- Minimum TWO Quartz Cuvette Included
- Additional, separate Static Light Scattering Channel for absolute molar mass determination

- Auto-Attenuation up to 10^5 to measure small and large particles
- Front panel display for status and raw data visualization
- Fast Ramping and Equilibration during Melting Studies

7. **Cell Cleaning Kit** should be included and compatible with above mentioned system

8. **Microbatch Filter Kit** for calibration of above mentioned system.

9. **LC-20AD BLK Solvent Delivery Unit should have**

    - Solvent Delivery Unit
    - Solvent delivery method: Parallel-type double plunger
    - Flow rate : 0.0001 mL to 10.000 mL/min

10. Constant-pressure & Constant Flow Rate solvent delivery
    Flow rate accuracy ±1% ; Flow rate precision: 0.06% RSD or equivalent
    Operating Pressure : 40 Mpa or 5800 psi (400 bar)or equivalent
    Safety measures: Liquid-leakage sensor, high-pressure/low-pressure limits must be included

10. Should include **Reservoir Tray, Washing Kit,20AD, Mixer SUS 20A**
11. **HPLC system UV-VIS Detector**

    UV-VIS Detector with Dual-Wavelength Mode for HPLC/SEC applications.

    Wavelength range : 190 - 700nm
    Wavelength accuracy :1 nm ; Noise : 0.5 X 10^{-5} AU

    Wavelength reproducibility : + 0.1 nm ; Drift 1 X 10^{-4} AU/h
    Simultaneous Dual Wavelength Detection; Long life D2 Lamp : 2000 hours
    Light source: Deuterium (D2) lamp, Mercury lamp for Wavelength, Include an additional lamp as spare

14. Solvent Bottles with caps and Accessories 5/pack

10. Appropriate software compatible with HPLC and MALS
11. Rheodyne Injector with 20ul loop & Mounting Plate
12. Suitable power cord
13. Various loops such as 10, 50,75,100,250µl,
14. Columns suitable for separation of different molecular weight systems (2 KDa to 200 Kda) and reverse phase columns

Data processing

- Automated and manual; remote connection capabilities
- Including comprehensive data analysis package with scripts. Additional licence for data analysis software

PC monitor: High resolution with capability for extension

Training:

1. Two users should be trained properly and extensively at the company site.
2. Must include an intense training by a company expert for all mode of data recording and analysis after installation
3. Periodic training by local engineers for usage of the instrument

UPS: 10 KVA or appropriate for the instrument

Temperature controller in the range of 10-80 degree C.

Warranty: 5 Years of Comprehensive (all parts, all electronic boards should be covered)