

Specification For Static Light Scattering (Multi-Angle) System with Refractive Index Detector

Integrated Multi Angle Static Light Scattering (SLS) with a Differential Refractive Index Detector for characterization of proteins and other biopolymers through *absolute* molecular weight determination under Gel Filtration Chromatography-Multi Angle Light Scattering mode (GFC-MALS)/Size Exclusion Chromatography-Multi Angle Light Scattering Detector (SEC-MALS) is to be quoted. The system shall be compatible with any Fast Protein Liquid Chromatography (FPLC) systems and also conventional HPLC systems, for online characterization. The system shall be upgradable in future with an online Dynamic Light Scattering Detection System for conducting *simultaneous* Static and Dynamic Light Scattering Detection under chromatography, using the same flow cell.

SLS System (Multi-Angle) Specifications

Light Source	30 mW or higher power laser with wavelength in the range of 630-680 nm
Detectors	Minimum 8 angles, within the range 13 – 160 Degrees, with simultaneous measurement capability using high-sensitive detectors. There shall be a 90 Degree Static Light Scattering as one of the angles. Facility to online monitor the detector signal from each angle should be provided. Option of cleaning of flow cell is desirable
Detector Resolution	24 bit with a dynamic range of >16,000,000:1
Operating Temperature	Ambient
Molar Mass Range	Up to 100 MDa
Molecular Size Range	10 - 200 nm as RMS radius
Sensitivity	0.5 µg/mL micrograms BSA under HPLC-SEC conditions
Measurement Options	Online-Mode (Chromatography) and Batch Mode (with volumes from 10 microlitres – 2 ml). Separate assemblies (cuvettes/vials/flow cells) should be provided to measure small volumes such as 10 microlitres. 2 quartz cuvette with necessary accessories for batch mode should be quoted. Separate cell / flow cell should be quoted for online Mode measurement. Batch mode should be through either flow cell directly or through use of vial assemblies. The system should enable determination of absolute molecular weights, 2nd vial coefficient and radius of gyration (R _g) in batch measurement mode using Zimm plots. Under chromatography, mode system should be capable of interfacing with any GPC
Software	Should report number, weight, Z-average molecular weights and root mean square sizes and their distributions. Shall be able to report the standard deviations of the measurements. Software

should correct for the band broadening effects arising from interfacing light scattering detectors to HPLC systems with additional detectors such as UV-VIS and also report standard deviations of the measurements.

Refractive Index Detector (RI): Able to generate dn/dc measurements on the polymer samples using the same wavelength as the Multi angle Light scattering detector light source and should be capable of being used as a concentration detector along with MALS (SLS) detector for measurement of absolute molecular weights. The detector shall be under the control of the same software that integrates all the other components (SLS, DLS).

The refractive index detector shall have the following specifications:

Light Source	:	Monochromatic Light Source with wavelength within 600 nm to 880 nm range. For differential refractive index increment dn/dc measurements, this light source must also provide same wavelength as that of the light scattering measurement MALS (for absolute molar mass determination via light scattering).
Differential Refractive Range(μ RIU)	:	$\pm 4700 \mu$ RIU
Peak to Peak Noise (RIU)	:	$\pm 7.5 \times 10^{-10}$
Cell Volume	:	< 10 microlitres
Dynamic Range	:	22+ bits, via digital communication
Absolute Refractive Index Range	:	1.2 – 1.7 RIU (sensitivity of ± 0.002 RIU)
Sample Temperature Control Range	:	Ambient +5 Deg C to 55 Deg C
Digital Communication	:	Ethernet

Safety and maintenance : Extensive diagnostics, error detection and display leak detection, safe leak handling, leak output signal for shutdown of pumping system, low voltage in major maintenance areas.

UPS: Should quote for at least 3 kVA / suitable UPS for running the instruments, computer and the printer. Should give a minimum backup time of 45 minutes for Power requirements: 230v, 50 Hz.

Consumables: Necessary consumables and spare parts, at least one set or pack as extra (including flow cells, micro cuvettes and macro cuvettes, syringe pumps, filter kits, operation and maintenance manuals, relevant publications, cleaning kits and other items to make the system fully functional for at least one year) should come with the instrument.

Computer and printer: Laptop or PC with specifications: I5 Processor, Min 4 GB RAM, Min 500 GB Hard Disk, DVD RW, 2 Ethernet Port, 2 USB Port, Operating system – Microsoft Win 7/8-Professional Original Licensed, Mouse and Keyboard. A LAN Switch with minimum 4 Ports is also to be provided. The PC shall be compatible with the Software that will run the system.

Warranty: 5 years comprehensive manufacturer warranty including parts, spares, labor etc. after installation must be provided on all components of instruments (MALS and RI detector) including computer and all other parts

Installation: Installation, demonstration & application training to be done at site. It should be free of cost by the supplier.