

NATIONAL CENTRE FOR SUSTAINABLE COASTAL MANAGEMENT

Ministry of Environment and Forests (MoEF)

Koodal Building, Anna University Campus

Chennai – 600025

ITEM: ALPHA SPECTROMETRY SYSTEM (Quantity 1 No.)

APPLICATION:

For identification and determination of Alpha emitting radionuclides such as U-238+234, Po-210, Pu-239+240, Am-241 etc in terrestrial and aquatic environmental samples (rice, vegetables, fish, seaweed, sediment, seaweed, soiletc); for quantitative identification of specific alpha emitting radionuclides and calculation of their activities.

TECHNICAL SPECIFICATIONS:

Description of the ITEM : Alpha Spectrometry work station complete with Eight chambers, 8 PIPS detectors, Multi Channel Analyzer, Ion recoil contamination prevention facility, MCA Control software and associated Analytical software with Chamber “O” Ring Accessories as per the detailed specifications given below

QUANTITY: 1 NO.

2. Detailed SPECIFICATIONS:

Alpha Spectrometry Workstation containing 8 input bench top spectrometer with the following specifications.

1.0	CHAMBERS	
1.1	No of Chambers	<p>Eight chambers consisting of four duo modules; upgradable to 12 chambers</p> <ul style="list-style-type: none">➤ Each duo module should be easily removable and vacuum line easily isolated with the supplied hardware;➤ facility for computer controlled chamber pressure monitoring and venting;➤ Each detector in the chamber should operate independently.➤ Each chamber should served with its own bias supply, preamplifier, digital signal processor based MCA, Multiplexer/Router and pulser;➤ The system should have “PUMP-HOLD-VENTILATION” facility;➤ capacity to hold large area detector upto 1200 mm²;

1.2	Material construction	Low Background Stainless Steel
1.3	Size (H x W x D) inches	3.3 X 2.4 X 2.5 inches approx
1.4	Sample Size	50 mm diameter (approx.)
1.5	Sample-to-Detector Spacing	1 to 45 mm; 4 mm increments
1.6	Vacuum range	0 to >200 Torr
1.7	Vacuum bias interlock	Should be turned on when vacuum level reaches <75 Torr
1.8	Reference Pulser	Independent pulser
1.9	Detector Bias supply range	± 0 to 100 Volts, 1 V increment
1.10	Recoil Suppression	Should be provided with suppression bias to repel recoil suppression;
1.11	Detector connector type	Axial Microdot type
1.12	Should be provided with facility	Pump/Vent/Hold
1.13	Detector size accommodation	Upto 1200 mm ²
1.14	Vacuum Monitoring	Provided with Vacuum Gauge to monitor each dual module
1.15	Emergency venting	Manual vent screw to vent in the event of communications, or power failure
1.16	Output signal	To connect to MCA
2.0	PIPS DETECTORS	
2.1	Detector type	PIPS (SiO ₂ Passivated Implanted Planar Silicon Detector) suitable for ultra low background alpha spectroscopy measurements; Low background, Low leakage current, Low noise, Thin window, Cleanable
2.2	Active area	450 mm ²
2.3	Active thickness	100 microns
2.4	Connecting type	Axial microdot
2.5	Active diameter	24 mm approx
2.6	Axial X	32 mm approx
2.7	Radial X	35 mm approx
	Quantity	8 Nos.
3.0	SPCETROMETER PERFORMANCE	
3.1	Energy Resolution	≤ 18 keV (FWHM) at a detector to source spacing equal to detector diameter
3.2	Detector Efficiency	$\geq 25\%$ for detector-to-source spacing of less than 1 mm
3.3	Background	Less than 20 counts above 3 MeV range
3.4	Type	Axial Microdot connector
4.0	DIRECT DRIVE VACUUM PUMP	

	<ol style="list-style-type: none"> 1. Vacuum Pump should be combatable for the above Alpha Spectrometry System 2. Displacement : 9.7 m h^{-3} 3. Speed : 8.5 m h^{-3} 4. ULTIMATE VACUUM (TOTAL PRESSURE) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">GAS BALLAST</th> <th style="text-align: center;">HIGH VACUUM MODE</th> <th style="text-align: center;">HIGH THROUGHPUT MODE</th> </tr> </thead> <tbody> <tr> <td style="text-align: left;">Closed</td> <td style="text-align: center;">$1.5 \times 10^{-3} \text{ torr}$</td> <td style="text-align: center;">$2.3 \times 10^{-2} \text{ torr}$</td> </tr> <tr> <td style="text-align: left;">Low flow, I</td> <td style="text-align: center;">$2.3 \times 10^{-2} \text{ torr}$</td> <td style="text-align: center;">$3 \times 10^{-2} \text{ torr}$</td> </tr> <tr> <td style="text-align: left;">High flow, II</td> <td colspan="2" style="text-align: center;">$4.6 \times 10^{-2} \text{ torr}$</td> </tr> </tbody> </table> <p>Necessary clamps, vacuum hose and connectors to connect to vacuum pump</p>		GAS BALLAST	HIGH VACUUM MODE	HIGH THROUGHPUT MODE	Closed	$1.5 \times 10^{-3} \text{ torr}$	$2.3 \times 10^{-2} \text{ torr}$	Low flow, I	$2.3 \times 10^{-2} \text{ torr}$	$3 \times 10^{-2} \text{ torr}$	High flow, II	$4.6 \times 10^{-2} \text{ torr}$	
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5.0	SOFTWARE													
	<p>Software for 8/16 ADC inputs, Windows XP/7/8 compatible with following basic features:</p> <ol style="list-style-type: none"> i. Acquisition drivers for a wide variety of MCA hardware ii. PHA and MCS modes iii. Peak search and manual selection of ROI iv. Energy calibration, net peak area v. Import/export of spectrum files in IEC/455 format vi. Windows based quantitative and qualitative alpha spectrum analysis software complete with peak search, determination of resolution, energy calibration, extensive alpha emitters' library, gross and net area calculation, display of peak information, live display of acquisition parameters, Efficiency calibration, and Instrument Performance Assessment. 													
6.0	Alpha spectrometer installation kit	Having all necessary flexible vacuum lines, all clamps, fittings, etc., to connect Spectrometer to vacuum pump, with or without optional filter or manifold												
7.0	Alpha analyst exhaust filter kit	To reduce noise and prevents oil contamination released into the air												
8.0 SPARES AND ACCESSORIES														
i. Detectors														
	No of detectors	8 nos; suitable for ultra low background alpha spectroscopy measurements												
	Active area	600 mm^2 , low background which must be installed and system tested.												
	Energy Resolution	$\leq 25 \text{ keV}$ (FWHM) at a detector to source spacing equal to detector diameter												
	Active thickness	150 microns												
	Detector Efficiency	$\geq 25\%$												

	Background	≤ 12 counts per day
	Type	Axial Microdot connector
ii.	“O” rings	10 nos
iii.	Alpha Standard Sources	Mixed Alpha Standard Source such as Pu-239, Am-241, U-238, U-234 etc (100 dpm approx. each)
iv.	Sample Holder	Multi size alpha spec holder