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MATERIALS MANAGEMENT DIVISION

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### **Technical Specifications for TG-DTA MS:**

TG (DTA) MS measurement system with suitable ionization technique combined to aquadropole mass spectrometer. The TGA system should be capable of working independently of MS. The switching between TG(DTA) and TG(DTA)-MS mode should be simple and quick.

### **Thermo-gravimetric Analyzer (TGA):**

Balance system	:	Differential triple coil system type
Sample holder	:	Twin holder type
Sample pan and material	:	Standard O.D.5mm × 2.5mmh (about 45 $\mu$ L)Al, Pt, alumina
Sample amount	:	Maximum 1g (about 90 $\mu$ L) or better Depending on the specific gravity of the sample
Thermocouple	:	13%RhPt-Pt or suitable thermocouple
Heating furnace	:	Standard temperature type electric resistance furnace
Range of measured temperature	:	Room temperature to 1,000°C
Measurement atmosphere	:	N <sub>2</sub> , Air, CO <sub>2</sub> , (He + O <sub>2</sub> 20%), software-based gas switching facility during the time course measurement.
Heating rate (program)	:	1°C/hour – 20°C/min or better
Measurement range	:	TG, maximum $\pm$ 250mg or better DTA, maximum $\pm$ 1,000 $\mu$ V/F.S or better

Temperature program settings	:	Temperature scan and Isothermal measurements. Sets the measurement control and analytical station on the PC screen
Automatic Furnace	:	Electric opening and closing mechanism of electric furnace Auto Sampler Facility

**Mass spectrometer (MS):**

Method	:	Quadrupole type mass spectrometer
Detector	:	Secondary electron multiplier tube
Measurement atmosphere	:	He and synthetic air (He + O <sub>2</sub> 20%)
Ionization mode	:	Electron ionization (EI) mode and/or Photoionization (PI) mode, or suitable technique.
Filament (EI)	:	Ytria coated iridium
Ionization energy	:	EI 70eV (changeable) PI 10.2eV
Range of mass number	:	<i>m/z</i> 1-300 or better
Resolution (resolving power)	:	1 amu or better
The detection limit of partial pressure	:	1.0×10 <sup>-12</sup> Pa
Measurement mode	:	TIC(SCAN) mode (extractive chromatography from TIC data) SIM mode (Maximum 16 channels) or Scan analog, scan bargraph, MID, etc.
Vacuum	:	Turbo-molecular pump Rotary pump
TG-DTA and MS Coupling:		Any suitable interface between TGA and MS along with appropriate ports and accessories should be provided

- Measurement control Software.
- The Software should be Windows 10 based.
- All the measurement and control for the TG (DTA) and MS should be from a single software.
- All the processing software for the TG (DTA) and MS should be included.
- Multiple displays of results should be included- TG(DTA) and MS Data in both 2 D and 3D views.

- NIST Library should be part of the system for MS analysis.
- Standard samples (In, Sn)-5gm or more, Standard sample (Zn, calcium sulfate), Standard reference( $\alpha$ -Al<sub>2</sub>O<sub>3</sub>) (at least two sets of each).
- Tweezers, Micro Spatula, Pt Pan (minimum 4 nos), Al Sample pans (minimum 500nos). Al<sub>2</sub>O<sub>3</sub> sample pan (minimum 4 nos).
- PC should be of the following Specs or better – CPU i7 or better. 16GB RAM, 1TB HDD, Graphics Card with 4GB memory, 24-inch LED Screen, Keyboard, Mouse (Branded).
- Brand new He and N<sub>2</sub> gas cylinder (2 nos each) of suitable purity with regulator should be quoted along with the system.
- All the tools and tackles required for analysis for the above systems should be part of the supply.
- All required utilities (eg. Gas tubing, connectors, etc.) to successfully install the instruments should be provided.
- Complete installation and training of TG-MS.
- Comprehensive Warranty- For the complete system (TG-MS) should be 3 years with a minimum of one training session per year.