

1. Statement of requirement.

1.1 The EIH laboratory at INM has a requirement for a Gas Chromatograph with Mass Detector (GCMS) to replace a 12 year old Agilent GCMS with Gerstel MPS (Multi-Purpose Sampler) which is life expired and too inflexible/not sensitive enough to cope with current sample workloads and ISO requirements. The system is used primarily for analysis of Volatile Organic Compounds (VOCs) in Drinking Water samples, though other qualitative analysis is performed on occasion.

1.2. The key requirements for the new system are as follows

- The system must be suitable for the analysis of Volatile Organic Compounds (VOC's) in drinking water samples.
- Evidence must be supplied that the proposed system can meet the requirements for Limit of Detection, Trueness and Precision detailed in "The Water Supply (Water Quality) Regulations 2000 as amended", Regulation 16 and Schedule 4 – Table A2 for the chemical analyte benzene.
- The system must also be capable of analysing VOC's in liquid solutions for research/method development purposes.
- The system must be capable of producing working calibration standards from a concentrated stock standard. The current system has a CTC type robotic head with a 100 ml syringe fitted that automates the preparation of working standards and injects internal standard into prepared vials containing samples for analysis. The current system is also used "off line" to prepare working standards in 2 ml amber vials for all of the laboratories organic analysis methods. This function must be retained for any proposed system.
- If the proposed system is to utilise a CTC type robotic head for "headspace injection" into the GC-MS, the proposed system must be configured with 2 heads to allow full automation of the analysis without analyst intervention.

2. Detailed specification

2.1 Sample introduction / standard preparation

- This must be fully integrated into the GCMS system hardware and software to produce a system that is able to work automatically and unattended as analysis is frequently set to run overnight. The CTC type robotic head must be supplied with sample trays (21 and 98 location trays for 2 ml vials) to allow the preparation of working standards in addition to any required for the analysis of samples.
- If a separate auto sampler is to be utilised to extract VOC's from the headspace of the sample vial, it would be ideal for the CTC robotic head to transfer the prepared sample vials from the sample tray to the auto sampler for analysis.

2.3 Gas chromatograph (GC)

- The GC must have a programmable oven with a temperature range of up to 300°C and have fast cooling between runs.
- The GC must also have a programmable split / split-less injector capable of being heated to 250°C.

3. Detectors.

- A mass selective detector system (MS) capable of EI sample ionisation. This will probably be a quadrupole system with the following specifications.
 - A mass range of 45 to 300 amu
 - Simultaneously collect total ion and single ion data
 - The source is to have a temperature range of 50°C to 350°C
 - Fast pump down from a vented state to allow quantitative use within 3 hours
- A Flame ionisation detector is to be supplied as a second detector.
- As the system is also to be used for qualitative analysis of VOC/SVOC's additional options for proposed systems should also be included.

4. Software

4.1 The proposed system software must have the following characteristics.

- The software must allow fully automated and integrated operation of both the GC-MS and CTC type systems.
- The software must include automated tuning of the MS
- Must be capable of being connected to a LIMS system.
- Must have the ability to upload existing methods to generate sample run lists.
- The software must be able to produce reports in a CSV file from both a calibration of target compounds and of non-target compounds following searching of the NIST database.
- Software must be supplied to control the CTC type robotic head and allow the automation of standard preparation without user intervention.

5. Consumables. The following consumables are to be supplied;

- The GC must be supplied with two Restek Rxi – 624Sil MS – 30m x 0.32mm ID x 1.8um df columns.
- Two of each syringe required for the system.

6. Demonstration of proposed system.

As the required system must meet the above technical requirements, it is requested that any proposed system is demonstrated to allow the laboratory to fully evaluate the systems.

7. Instrument installation and method setup.

- Once received, the instrument is to be installed within one month from delivery. Following installation, the successful supplier is to provide onsite application support to set-up a basic working method and demonstrate that the performance of the system meets the requirements for Precision detailed in "The Water Supply (Water Quality) Regulations 2000 as amended", Regulation 16, Schedule 4 – Table A2 for the chemical analyte benzene.

8. Training

The proposed system must include training in the operation, maintenance and troubleshooting of the system for 2-3 operators.