

**Specifications for a Fully Automated Qualitative Analysis System to couple with Gas Chromatography-Mass Spectrometry (GC-MS):**

The system must be able to perform automated sample preparation, sample extraction and injection into the existing GC-MS system (Model: Agilent 7890B/5977B).

The specifications required are:

**1. Type:**

- XYZ robot with Syringe only concept
- $\pm 0.1$ mm positional accuracy or better
- Can be used as stand-alone unit as well as upgradeable for on-line injection to GC and GC-MS systems.
- Able to mount on existing GC-MS system
- Dimensions must not exceed the length of 150 cm and depth of 80 cm
- Multifunctional, flexible autosampler with robotic functionality
- Automatic syringe exchange with the capability to handle at least 3 syringe tools
- Capable of performing online automated sample preparation, sample extraction and injection to GC-MS at high sample capacity
- Automatic tool recognition

**2. System Control:**

- By software via either RS232C or LAN/Ethernet communications
- Keypad

**3. Sampler:**

- XY Unit should be at least 100 cm wide to allow at least 3 modules to be attached.
- Automatic syringe exchange controllable by software.

**4. Software:**

- PC based and communicate via RS232C or LAN
- Must have intuitive sample sequence building capabilities using simple and easy to understand terms to carry out actions such as ADD, MIX, MOVE.
- Must have a sample scheduler to provide an overview of the total time required for preparation of the entire batch, current status and time-to-go.
- Must have the function to schedule the automated sample preparation steps and instrumental analysis concurrently and simultaneously.
- Must have real-time software monitoring of all modules and parameters
- Must have instrument activity log file and service log file functions to ensure traceability and to facilitate troubleshooting
- Must be compatible with Agilent's MassHunter and ChemStation software to allow coupling to current available Agilent GC-MS (Model No: 7890B/5977B)
- Must be able to integrate with current Agilent chromatography data system to form a unified and error-free system capable of carrying out automated sample preparation and sample introduction into the GC system seamlessly with the use of one method, one sequence table and one software.
- Preferably to have automatic E-Mail notification if the system stops prematurely

**5. Sample Holder and Vials:**

The price quoted shall minimally include the following items:

- i. Sample holder must be able to hold at least 150 x 2 ml vials, 24 x 4 ml vials and 15 x 10 ml vials.
- ii. Tray type and stack drawer type of sample holder must be provided as follow:
  - a. 1 set of Stack drawers that can store 2 ml, 4 ml and 10 ml vials at room temperature. No temperature control needed for the stack drawers.
  - b. 1 multi-purpose tray that can be used to store vials, syringe filters and liners
  - c. 6 sample racks for 2 ml, 2 sample racks for 4 ml and 2 sample racks for 10 ml vials
- iii. Vials to include:
  - a. At least 100 of 2 ml vials and magnetic crimp caps with septum for vials.
  - b. At least 50 of 4 ml vials and magnetic crimp caps with septum for vials.
  - c. At least 50 of 10 ml vials and magnetic crimp caps with septum for vials.
  - d. Vials and magnetic crimp caps must be suitable for most organic solvents such as methanol, ethanol, chloroform, ethyl acetate, petroleum ether and dichloromethane.

**6. Wash and Solvent Reservoirs**

The price quoted for the system must minimally include the following:

- i. 2 x solvent bottles and one waste position (For washes and cleaning of syringes). The capacity of each solvent bottle must be at least 100 ml.
- ii. One solvent waste container connected to the waste position (at least 1L)
- iii. 3 x solvent bottles for addition of large liquid volumes (solvent reservoirs). The capacity of each solvent bottle must be at least 180 ml.
- iv. An additional 2 x solvent bottles with at least 180 ml.

**7. Syringe Filters**

- a) At least 1 set of syringe filter must be provided that able to filter sample volume sizes of 0.5 to 1.0 ml using 4mm filters.
- b) 1x syringe filter disposal container must be provided that able to hold up to 100 of the syringe filters as described in (a).

**8. Vortex/mixing**

- Must be able to mix (agitate/mix) 2, 4 and 10 ml vials with variable speeds that allow fast and efficient mixing.

**9. Automatic Syringe Exchangers**

- i. The Automatic Syringe Exchangers holder must be able to hold at least 3 different syringe modules.
- ii. Syringe modules must minimally include:
  - a) One 5 µl syringe module for GC injection;
  - b) Two 5 ml syringe modules for sample preparation and filtration; and

c) 1 x 5 µl and 1 x 5 ml syringes.

10. Power Requirements: Must be compatible to lab power requirements, Single phase ~20A/~240V.

11. Optional Items / Schedule of Rates (SOR) items

- i. Tenderer is required to quote 1D/2D barcode reader as optional items in Price Schedule. Tenderer shall also specify whether the barcode reader quoted is capable to read 1D or/and 2D barcode. Barcode label printing device is **NOT** required.
- ii. Tenderer shall also quote for the following items as SOR that the prices quoted shall be valid throughout the warranty period.
  - a) SPME-HS using Arrow SPME
    - For the purpose of carrying out headspace-solid phase microextraction
  - b) Automated Liner Exchange
    - To allow automated changing of liner when needed
  - c) Centrifuge
    - Must be compatible with the proposed automated qualitative system using same software control
    - Must be able to spin 2 ml and 10 ml vials
    - Minimum speed of 2000 rpm.
  - d) Fast Wash Station
    - Wash station that provides efficient cleaning of syringes with at least 2 different solvents
  - e) Standard Wash Station
    - 4 x 10 ml solvent vials and 1 x 10 ml waste vial for cleaning of syringes.

12. Installation, Commissioning, Training and Warranty

- The offer must include delivery, installation and commissioning of the system.
- The installation must include the coupling and interface of the automated sample preparation and injection to the current Agilent GC-MS system.
- Contractor is required to assist laboratory to set up at least 4 customised workflow methods
- Minimum two-year warranty shall be provided on all hardware (e.g. electronic boards, pumps, etc) of the system upon date of successful commissioning of the unit that includes:
  - a) 2 Preventive Maintenances (PM) annually;
  - b) Supply of all replacement parts;
  - c) Provision of PM kit (if applicable);
  - d) Provision of unlimited breakdown calls during Office Hours i.e. 8am to 5:30pm from Monday to Friday, exclude Saturday, Sunday and Public Holiday; and
  - e) Software updates/ upgrades
- Contractor shall also conduct a sharing session/ presentation in HSA within 6 months after the commissioning of the unit for approx. 55 laboratory staff that minimally include the following:
  - o Background of the automated system; and
  - o System functionality.
- The details/ agenda of the sharing sessions/ presentation shall be discussed with the laboratory.

- Different forensic applications using automated system and training on operation of hardware, software and advanced maintenance to be provided for not more than 6 laboratory staff.

13. Tenderer shall quote for the 3-year post warranty comprehensive maintenance contract for the whole system that shall minimally include the following:

- a) 2 Preventive Maintenances (PM) annually;
- b) Supply of all replacement parts;
- c) Provision of PM kit (if applicable);
- d) Provision of unlimited breakdown calls during Office Hours i.e 8am to 5:30pm from Monday to Friday, exclude Saturday, Sunday and Public Holiday; and
- e) Software updates.

**13.1 The Services to be performed by the Contractor shall consist of Preventive Maintenance and Corrective Maintenance as described below.**

**13.1.1 Preventive Maintenance**

- a) The Preventive Maintenance shall consist of:

Routine maintenance of the Equipment, including but not limited to the testing of functions and inspecting of the condition of the Equipment in order to keep the Equipment safe for use and in Good Working Order; and

Adjustment and/or repair of any defect in or malfunction of the Equipment discovered by the Contractor's representatives during the course of routine maintenance checks.

- b) The Preventive Maintenance performed shall be in accordance to manufacturer's specifications.
- c) The Preventive Maintenance shall be carried out during Office Hours.
- d) The Contractor shall give the Authority a minimum of three (3) days' notice before carrying out the Preventive Maintenance at the Authority's premises

**13.1.2 Corrective Maintenance**

- a) Upon receipt of oral or written notice from the Authority, the Contractor shall use its best endeavours to ensure that the Contractor's suitably qualified and duly authorised representatives attends to the Authority, within the response time of not more than forty-eight (48) hours upon receipt of oral/written notification if the request is made on a Working Day. If the request is made on a non-Working Day, the Contractor shall respond within the first forty-eight (48) hours of the beginning of the next Working Day.
- b) The Contractor shall complete any repair, or replacement or adjustment of components within one (1) week from and including the date on which the Contractor was given notice pursuant to Clause 13.1.2(a), unless the Authority had agreed in writing to have the time period extended.

**14. Replacement And Purchase Of Components**

- 14.1 The Contractor shall inform the Authority of any part or component of the Equipment that needs to be replaced. Prior written approval must be issued by the Authority before the replacement may be effected unless the replacement required is deemed urgent by the

Authority in which case a verbal approval (which shall subsequently be confirmed in writing) obtained from an authorised officer of the Authority shall suffice.

- 14.2 The Contractor shall use all reasonable endeavours to supply only original or genuine replacement components, which are required to maintain the Equipment in Good Working Order.

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**COMPLIANCE TO REQUIREMENT SPECIFICATIONS**

**I hereby confirm that I can meet all the  
Requirement Specifications as stated above.**

**YES / NO\***

\*Please indicate any non-compliance here should there be any.

| Reference To | Remarks |
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