

Technical specifications of FT-IR Spectrometer

We would like to buy a FT-IR spectrometer which has to be integrated with a Gas Chromatograph with the following technical specifications.

1. The spectrometer should be able to record the spectrum of a sample in the wavelength region of 400-7500 cm^{-1} . Up to 11000 cm^{-1} should be possible with an additional beam splitter should be quoted as an option
2. The spectral resolution should be better than 0.1 cm^{-1} .
3. The spectrometer must include a user replaceable helium-neon laser reference source. The laser must be of a modular design permitting simultaneous replacement of the laser emission head and power supply.
4. The infrared source must have a guaranteed lifetime of a minimum of **5** years and must be user replaceable.
5. The Interferometer must be a dynamically aligned, non-air bearing/air bearing/any other advanced type Michelson design. Non-air bearing one will be given priority.
6. The interferometer must be capable of supporting an optional Automatic Beamsplitter Exchanger accessory without modification.
7. Standard warranty on the interferometer must be a minimum of 5 years.
8. The spectrometer must be able to scan at a minimum rate of 50 scans per second at a spectral resolution of 16 cm^{-1} .
9. The interferometer must permit insertion of a wide range of beamsplitters without requiring replacement. Beamsplitters must be available for the instrument to cover the spectral range at least from 25,000 to 50 cm^{-1} .
10. The spectrometer must have a motorized, continuously variable aperture, for optimal peak shape collection of data.
11. The instrument must be capable of at 50,000:1 peak to peak signal to noise, measured at 4 cm^{-1} resolution in the well proved standard region of 2200-2100 cm^{-1} .
12. The system must be able to support an optional white light source to be used for near-IR or visible operations, mounted in a similar manner to the infrared source and similarly user-replaceable.
13. The spectrometer cover shall be **sealed and desiccated** and must be equipped with CaF_2 coated KBr sample compartment windows. The instrument must be equipped with the necessary internal plumbing and external connector for optional purge operation.

14. The instrument must support up to **three detectors**.
15. The system should have one DLaTGS detector to function at room temperature and a MCT detector with associated liquid nitrogen cooling facility.
16. Both DLaTGS detector and MCT Detector should be mounted in the detector compartment in the factory itself. Each detector should be selectable by an optional rotating mirror with the help of software, for use with the sample compartment. We do not want to store the detectors outside for replacement.
17. The spectrometer must support additional detector externally.
18. The system must be able to provide left and right **external beams** for supporting additional sampling modules.
19. The spectrometer must support optional **external beam entry ports** for use with external sources.
20. The instrument must support an automated **infrared polarizer**. This polarizer must allow software to insert the polarizer into (or remove it from) the IR beam path and to control the rotation.
21. The sample compartment should be able to accommodate a gas sample cell of at least 20 cm length, when it is closed.
22. A long path length (2, 5 and 10 m) gas cell (a multi-pass cell) should be accommodated in the sample compartment, without any modifications to the sample compartment. These cells may be quoted as optional accessories.
23. The optional Automated Beamsplitter Exchanger shall provide locations for up to **3 beamsplitters** supported by the interferometer. This device shall allow full spectral range for available beamsplitters to be realized without manual handling of the fragile optical components and without interruption of the purge or sealed and desiccated condition of the spectrometer.
24. The FT-IR spectrometer should be integrated with an existing Agilent's Gas chromatograph (Model No. 7890 B), by your technical experts in our site. Therefore, the accessories for interfacing the GC through hyphenation should be quoted. The interface should include the necessary optics, MCT detector, heating line, transfer line and all the associated and necessary electronics with the controlling software should be quoted. The FT-IR spectrometer should have necessary software driven turning optics for this purpose.
25. We should be able to use the FT-IR spectrometer independently in the absence of GC.

26. In case if you are able to supply the GC-FTIR as an integrated system, please quote your own GC with the attached specifications (please see the attachment) and the necessary interfacing accessories and suitable advanced software as an option.
27. The software must be fully compatible with Microsoft Windows XP (32-bit) and Windows 7 (32-bit and 64-bit).
28. Software must support one-click operation using clearly visible icons to switch to any sample compartment from any other sample compartment and load proper experiment settings to collect data.
29. The software must support stability testing for sample compartments such as built-in ATR, NIR Integrating Sphere and Main Sample compartment to indicate to users when the instrument is ready for collection.
30. Software must support loading of Automatic Beamsplitter Exchanger beamsplitters and identifying them.
31. Software must support both Advanced and Basic experiment setup functionality. The Basic functionality must support measurement time/number of scans, resolution, final format, spectral region (over the full range supported by the available hardware) and indicate current source, beamsplitter and detector. The Advanced experiment setup functionality must support additional parameter settings such as Corrections, Background collection number of scans, Gain selection, Optical Velocity selection and Aperture settings.
32. Software must support all possible background handling options.
33. An automated polarizer for the IR beam passing into the sample compartment must be supported. This must include movement of the polarizer into and out of the IR beam and control of the rotational angle of the polarization.
34. An extensive set of spectral libraries must be available, including Raman, NIR and mid-IR spectral references.

General specifications

1. The FT-IR spectrometer must be installed by the technical persons of the vendors/principles.
2. The FT-IR spectrometer should be integrated with an existing Agilent's Gas chromatograph (Model No. 7890 B), by your technical experts in our site.

3. Proper demonstration/training should be given to the students at the time of installation.
4. All the necessary accessories to record a spectra (both solid and liquid) should be provided.
5. **A list of references in India, where similar systems have been installed, must be provided and this will be taken very seriously while making the decision. Your post sales service feedback will be certainly a deciding factor.**
6. A multi-pass gas cell with at least 2 meter, 5 meter and 10 meter path length should be quoted as an optional accessory.
7. A branded computer and printer should be supplied with the system.
8. The spectrometer should have a minimum of 2 years warranty.

GC Specifications

The system should have a total of two Split/Splitless inlets (for a capillary column). System should be capable of supporting two inlets and two detector ports simultaneously.

System should have electronic pressure controls (EPC) for all the gases.

System should be supplied with the software, which is based on Microsoft Windows operating system for instrument control, data acquisition, data analysis, quantization, automation & customization with online and offline sessions provided.

System should have capability of locking / adjusting the retention time so that same Retention time can be reproduced from system to system and the method should be electronically transferred. NIST 2011 library along-with AMDIS and deconvolution should be provided and also Retention Time Locked database for, VOC and Semi-VOC to be provided

System should be designed and manufactured under ISO9001 and should comply with most of international regulatory, safety and electromagnetic compatibility requirement

The instrument should meet the following requirements

1	Provision to install two or more columns
2	Operating temp range of oven from near ambient to 450°C
3	Retention time repeatability should be <0.01%
4	The ramp rate of the oven should be a minimum of 60°C and a maximum of at least 100°C or better/min. The oven should be able to cool down in a maximum of 5 min or better
5	Possible to program 20 temp ramps (21 plateaus)
6	Flow sensor for control & storage of split ratio
7	Possible to use capillary columns of 50, 100, 250, 320 microns and Above
8	The pressure set points should be adjustable by increments of 0.001 psi up to 100 psi. Maximum temperature attainable should be 400°C or more
9	Inlets: Two split/split less Capillary inlets; both with EPC should be provided.
10	The system should have one ECD detector with the following specification or better: Minimum Detection Level: Min 4fg /Sec or better. Data Acquisition rate: up to 50 HZ. Detector should reach 400C temperature. Detector should have the facility to minimize the contamination and optimizes sensitivity.
11	The system should have one FID detector with the following specification or better: • MDL: less than 2 pg N/s OR BETTER(SPECIFY THE COMPOUND) • Dynamic range: > 10 ⁷ • Data acquisition rate: up to 500 Hz OR BETTER All gases flow should be adjustable/controlled by software only.
12	NPD as optional detector with the following specifications should be quoted Minimum Detection Level: At least 0.1PG N /Sec or better. Data Acquisition rate: up to 200 HZ or better. Detector should reach 400C temperature. All gases flow should be adjustable/ controlled by software with no manual control.
13	2 (two) Six port Gas sampling valves along with the corresponding actuators should be installed in the system in such a way that each inlet is connected to one six port gas sampling valve for online gas sampling. each valve should be provided with 0.5 CC loop and two additional loops of 1CC each should also be supplied.
14	Pressure set point and Control precession to 0.001PSI
15	Instrument should meet the international safety standards.
16	The GC should be provided with necessary fittings to integrate FT-IR of any make in future with the help of hyphenation using the necessary optical/thermal interface of a third party. The presence of these accessories should not limit or restrict our usage and an independent GC