TORONTECH

FTIR SPECTROMETER - TORONFTIR™ 7800

FTIR Spectrometer for Pharmaceutical, Polymer, Lubricant, and Petrochemical Analysis

ToronFTIR™ 7800 benchtop FTIR spectrometer delivers high-resolution molecular and material analysis for laboratories, quality-control departments, and research facilities across many industries. The instrument builds on the Michelson interferometer principle and uses computer sampling to convert an interferogram into a complete infrared spectrum. This approach gives the analyst wide spectral coverage, high light throughput, and short measurement times in a single scan. The ToronFTIR™ 7800 serves material identification, contamination analysis, and quantitative work where confirming chemical composition matters.

The system covers a spectral range of 7800 to 350 cm^{-1}, extending from the near-infrared into the far end of the mid-infrared fingerprint region. A fully enclosed optical bench protects the interferometer and detector from moisture and airborne contaminants, so results stay stable across changing lab conditions. Operators pair the ToronFTIR™ 7800 with a broad set of sampling accessories, which lets one instrument handle solids, liquids, powders, films, pastes, and gases without a separate platform for each sample type.

Beyond routine identification, the ToronFTIR™ 7800 supports condition monitoring of in-service oils, biodiesel FAME content testing, and polymer characterization. A bundled spectral analysis suite includes a compound reference library of more than 200,000 spectra, quantitative modules, and standard-curve models. This makes the spectrometer a practical fit for pharmaceutical QC, petrochemical labs, materials research, and general analytical testing.

APPLICATIONS

FTIR Spectrometer - ToronFTIR™ 7800 Applications

The ToronFTIR™ 7800 supports infrared analysis across a wide range of sample types and industries, from raw-material verification to advanced research.

- Pharmaceutical and Healthcare: identity confirmation of raw materials, excipients, and finished products, plus food and drug packaging material testing for GMP-aligned workflows.
- Polymer and Material Science: characterization of plastics, rubber, adhesives, asphalt, and resins, along with contamination, degradation, and additive analysis.
- Lubricating Oil and Fuel Testing: trend analysis of in-service oils, T501 antioxidant content in transformer and turbine oils, and benzene content checks in gasoline.
- Petrochemical and Biodiesel: FAME content determination in middle distillates and structural cluster analysis of mineral insulating and lubricating oils.
- Environmental Monitoring: identification of petroleum and animal or plant oils in water and soil, and screening of organic solvents and reaction products.
- Building and Glass Testing: hemisphere emissivity of architectural glass, U-value of insulating glass, and general material emissivity measurement.
- Gemology and Electronics: jewelry appraisal by diffuse reflectance, and interstitial oxygen or substituted-carbon measurement in silicon wafers.

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ToronFTIR™ 7800
FTIR Spectrometer

Standards

The ToronFTIR™ 7800 is designed and built to align with internationally recognized infrared test methods for in-service lubricant monitoring and fuel analysis. Bundled quantitative modules correlate directly with the methods below.

- ASTM E2412 - Standard Practice for Condition Monitoring of In-Service Lubricants by Trend Analysis Using Fourier Transform Infrared (FT-IR) Spectrometry
- EN 14078 - Liquid Petroleum Products: Determination of Fatty Acid Methyl Ester (FAME) Content in Middle Distillates: Infrared Spectroscopy Method

FEATURES

FTIR Spectrometer - ToronFTIR™ 7800 Key Features

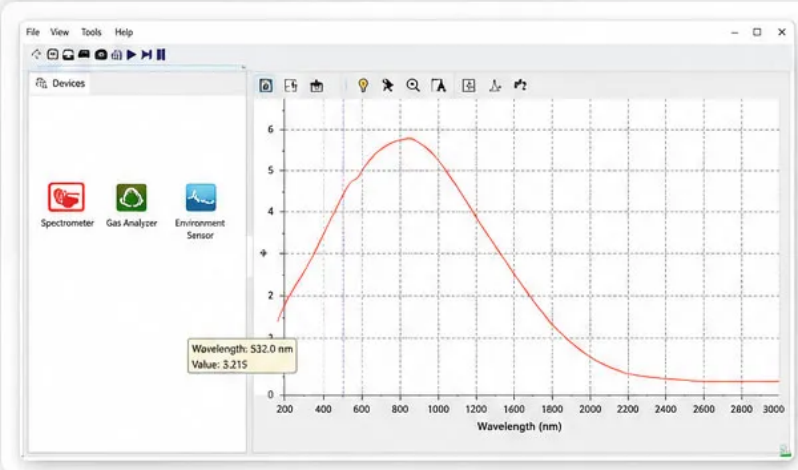
The ToronFTIR™ 7800 combines a stable optical platform with flexible sampling and data tools that suit both routine QC and research settings.

- Wide Spectral Coverage: scans 7800 to 350 cm^{-1} across near- and mid-infrared, with an optional 7800 to 650 cm^{-1} configuration for targeted work.
- High Signal-to-Noise Ratio: better than 20,000:1 as standard, with an optional configuration better than 45,000:1 for low-concentration and trace analysis.
- Sealed Optical Bench: fully enclosed interferometer and detector compartments shield core optics from humidity and corrosive gases for consistent long-term performance.
- Gold-Plated Corner-Cube Mirrors: integrated, adhesive-free moving and fixed mirrors hold optical alignment and resist drift over the instrument's service life.
- DSP-Controlled Drive: digital signal processing manages the electromagnetic interferometer and keeps the moving mirror permanently collimated during each scan.

- Flexible Detector and Beamsplitter Options: an MCT cooled detector and a ZnSe beamsplitter are available to match demanding sensitivity and spectral-range needs.
- Broad Accessory Range: ATR, diffuse reflectance, specular reflection, transmission, in-situ, and gas-cell attachments let one platform cover most sample formats.
- Extensive Spectral Library: more than 200,000 reference spectra, quantitative modules, and standard-curve models speed up identification and quantitation.
- Intelligent Environmental Control: real-time temperature and humidity monitoring alerts operators when conditions fall outside the safe range, reducing the risk of instrument damage.
- Modern Data Interface: high-speed USB 2.0 and 3.0 connectivity with Windows 7, 10, and 11 support for straightforward integration into existing lab systems.

Multifunctional Analysis Software

A powerful platform for multi-parameter data acquisition, visualization, and analysis to meet diverse research and testing needs.

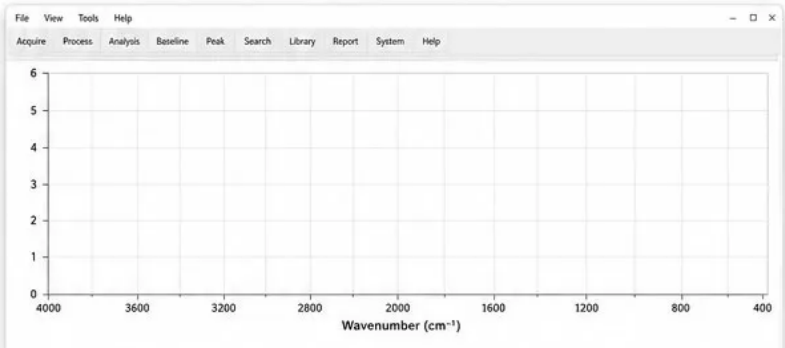


Environmental Analysis and Gas Analysis System

Integrated system for environmental monitoring and gas analysis, delivering accurate data and real-time insights for a cleaner, safer future.

Conventional Fourier Spectrometer Testing System

High-precision Fourier spectrometer platform for spectral analysis across a wide range of applications.



THEORY & METHOD

Theory and Method

Fourier transform infrared spectroscopy identifies materials by measuring how they absorb infrared light. Every chemical bond vibrates at characteristic frequencies, so the pattern of absorbed wavelengths forms a molecular fingerprint that reveals what a sample contains. Rather than scanning one wavelength at a time, the ToronFTIR™ 7800 records all infrared wavelengths at once. This multiplex approach collects a full spectrum in a single measurement, which shortens analysis time and improves the signal available at the detector.

At the heart of the instrument sits a Michelson interferometer. A beamsplitter divides the infrared beam into two paths: one reflects off a fixed mirror, the other off a moving mirror. When the two beams recombine, the changing path difference makes each wavelength reinforce and cancel in a pattern called an interferogram. The instrument then applies a Fourier transform, a mathematical operation that converts the interferogram into a readable spectrum of absorbance against wavenumber.

The ToronFTIR™ 7800 applies this principle with integrated gold-plated corner-cube mirrors that hold alignment without adhesives, and a DSP-driven electromagnetic interferometer that keeps the moving mirror collimated during travel. A semiconductor laser tracks mirror position for accurate wavenumber calibration, while a moisture-protected KBr beamsplitter and high-intensity air-cooled source maintain throughput across the full 7800 to 350 cm^{-1} range.

TECHNICAL SPECIFICATIONS

FTIR Spectrometer - ToronFTIR™ 7800 Technical Specifications

Parameter	Specification

Spectral Range	7800 to 350 cm^{-1} (optional 7800 to 650 cm^{-1})
Signal-to-Noise Ratio	Better than 20,000:1 (optional better than 45,000:1)
Wavenumber Accuracy	≤ 0.01 cm^{-1}
Detector	Infrared detector; optional MCT (mercury cadmium telluride) cooled detector
Laser	Semiconductor laser; optional HeNe laser
Beamsplitter	Multi-layer coated KBr with moisture-proof coating; optional ZnSe
Infrared Source	Long-life, high-intensity, air-cooled IR source
Scanning Speed	Microcomputer-controlled, continuously adjustable, multiple selectable speeds
Optical Bench	Integrated design with fully enclosed interferometer and detector compartments
Interferometer Mirrors	Integrated gold-plated corner-cube (moving and fixed), adhesive-free
Reference Spectral Library	≥ 200,000 spectra
Data Interface	High-speed USB 2.0 / 3.0
Operating System	Windows 7 / 10 / 11
Environmental Control	Intelligent temperature and humidity monitoring with real-time alerts
Design Compliance	EMC electromagnetic compatibility design

Standard Configuration

Item	Quantity	Description
FTIR Analyzer Host	1	Main spectrometer unit with integrated optical bench
Tablet Press	1	For pressing KBr sample pellets

Item	Quantity	Description
Pellet Die Set	1 set	13 mm inner diameter, no-demold design
Detachable Liquid Cell Set	1 set	KBr windows, 30 × 5 mm
Spectral-Grade KBr	50 g	For pellet and window preparation
Agate Mortar Set	1 set	Sample grinding and preparation
Electronic Dry Cabinet	1	Moisture-controlled storage for optics and consumables
Control Terminal	1	i5 or higher CPU, ≥ 1 TB HDD, ≥ 21.5-inch display, keyboard and mouse

Optional Sampling Accessories

01

ATR Attachment

Used for testing plastics, asphalt, resins, rubber, liquids, and other non-acidic materials.

Compatible crystal options include zinc selenide and diamond.

02

Multi-Component Gas Accessory

Supports conventional infrared absorption materials such as KBr, ZnSe, NaCl, and CaF_2.

03

Diffuse Reflection Attachment

Suitable for testing powders, granules, jewelry, and ores.

04

In-Situ Attachment

Designed for in-situ infrared analysis.

05

Flat Reflection Attachment

Suitable for thin-film samples, glass coatings, and flat-mounted specimens.

06

Sample Transmission Attachment

Designed for thin-film and tubular samples.

Accessory	Application
ATR Attachment (ZnSe or diamond crystal)	Plastics, asphalt, resins, rubber, liquids, and non-acidic samples
Diffuse Reflectance Attachment	Powders, granules, jewelry, and ores
Specular / Flat Reflection Attachment	Thin films, glass, coatings, and flat-placed samples
Multiple-Reflection Attachment	Non-corrosive liquids and pastes
Sample Transmission Attachment	Thin-film and tubular samples
In-Situ Attachment	Infrared in-situ reaction analysis
Detachable Liquid Cell	Organic solvents, liquid reaction products, and polymer solutions
Multi-Component Gas Cell	Gas-phase analysis with KBr, ZnSe, NaCl, or CaF2 windows

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