



SPECTROSCOPY AND SPECTROMETRY INSTRUMENTS

Spectroscopy and Spectrometry Instruments

Precision Elemental & Molecular Analysis for Modern Laboratories

Spectroscopy and Spectrometry Instruments are the foundation of modern analytical chemistry — the indispensable tools that allow scientists, engineers, and quality-control professionals to identify the elemental composition and molecular structure of virtually any material. By measuring the way matter interacts with electromagnetic radiation — through emission, absorption, fluorescence, or diffraction — these instruments can detect trace constituents at parts-per-billion levels and characterize complex compounds with extraordinary precision.

Torontech offers one of the most comprehensive ranges of spectroscopy and spectrometry instruments available today. The portfolio spans the entire analytical spectrum: X-Ray Fluorescence (XRF) and X-Ray Diffraction (XRD) analyzers for non-destructive elemental and crystallographic characterization; Atomic Absorption Spectrometers (AAS) for precise metal quantification; Optical Emission Spectrometers (OES) including benchtop, mobile, and rotating-disc-electrode variants; Fourier Transform Infrared (FTIR) Spectrometers for molecular fingerprinting; Carbon & Sulfur Analyzers for combustion-based elemental determination; UV-VIS Spectrophotometers for absorbance and transmittance studies; LIBS Analyzers for laser-induced breakdown spectroscopy; ICP-OES systems for high-throughput multi-element analysis; Atomic Fluorescence Spectrometers for ultra-trace toxic-metal detection; and Ion Chromatographs for the separation and quantification of anionic and cationic species.

Every Torontech spectroscopy instrument is engineered around a common philosophy: deliver laboratory-grade analytical performance with intuitive operation, robust construction, and full compliance with the international standards that governments, regulators, and customers demand — including ASTM, ISO, USP, EPA, FDA CFR 21 Part 11, and the relevant pharmacopoeia, environmental, and industry-specific methods. Whether your lab needs trace-element analysis in drinking water, alloy verification on a factory floor, polymer identification, or rapid quality control of incoming raw materials, there is a Torontech spectroscopy solution engineered to fit.

Equip Your Laboratory for the Next Generation of Analysis

Modern science demands analytical instruments that combine speed, accuracy, automation, and regulatory compliance — without compromise. Whether your laboratory is developing new pharmaceuticals, verifying alloy compositions on a busy production floor, monitoring environmental water quality, characterizing advanced polymers, or pushing the frontiers of academic research, the Torontech spectroscopy and spectrometry portfolio gives you the tools to deliver reliable, defensible, world-class data — every day, on every sample.

From handheld XRF analyzers used in scrap yards to high-end ICP-OES systems running 24/7 in commercial testing laboratories, Torontech instruments power the analytical workflows of thousands of professionals worldwide. Don't compromise on the equipment that determines whether your products, materials, and decisions are based on solid data. Equip your laboratory with the spectroscopy platform trusted by quality-assurance teams, R&D scientists, and regulatory professionals across every continent.

APPLICATIONS

Applications in Industries

Spectroscopy and spectrometry techniques are mission-critical across virtually every science-driven sector of the modern economy. The Torontech instrument range supports a vast spectrum of industrial, regulatory, and research applications, including:

- **Metals & Metallurgy** — Alloy verification, PMI (Positive Material Identification), scrap sorting, foundry QC, steel composition control, and incoming-material screening using XRF, OES, LIBS, and Mobile OES.
- **Petroleum, Lubricants & Petrochemical** — Wear-metal and additive analysis in used oils, sulfur determination in fuels, and elemental characterization of crude, biodiesel, and refinery streams using RDE-OES, XRF, ICP-OES, and Carbon/Sulfur analyzers.

- **Environmental & Water Analysis** — Detection of heavy metals, anions, cations, and pollutants in drinking water, wastewater, soil, and air particulates using AAS, ICP-OES, AFS, Ion Chromatography, and UV-VIS spectrophotometry.
- **Pharmaceutical & Biotechnology** — Raw-material identification, residual-metal analysis per USP <232>/<233>, API verification, DNA/protein quantification, and FDA CFR 21 Part 11-compliant documentation using FTIR, UV-VIS, AAS, and ICP-OES.
- **Food, Beverage & Agriculture** — Trace-metal screening, nutritional analysis, contaminant detection, additive verification, and regulatory compliance testing using AAS, AFS, Ion Chromatography, and UV-VIS instruments.
- **Mining & Geology** — Ore grade analysis, mineral characterization, precious-metal verification, and geochemical exploration using XRF, XRD, ICP-OES, LIBS, and AFS technologies.
- **Electronics & Semiconductor** — RoHS hazardous-element screening, ionic-contamination analysis of ultrapure water and PCBs, semiconductor-grade material verification using XRF, FTIR, and Ion Chromatography.
- **Polymers, Plastics & Chemicals** — Polymer identification, additive analysis, raw-material quality control, and reaction monitoring using FTIR, UV-VIS, and Carbon/Sulfur analyzers.
- **Cement, Ceramics & Construction Materials** — Quality control of clinker, raw mix, ceramics, and refractories using XRF, Carbon/Sulfur analyzers, and OES.
- **Universities, Research Institutes & Forensic Labs** — Method development, fundamental materials research, forensic evidence analysis, and academic training across the full spectroscopic toolkit.

FEATURES

Why Choose Torontech for Your Spectroscopy Needs

With more than two decades of experience supplying advanced analytical instruments to laboratories, research institutions, and industrial facilities across more than 60 countries, Torontech has earned a global reputation as a trusted partner for spectroscopy and spectrometry solutions. Choosing a Torontech spectroscopy instrument means investing in more than just

hardware — it means partnering with an organization committed to your long-term analytical success.

Comprehensive Multi-Technique Portfolio

Torontech offers one of the broadest spectroscopy portfolios in the market: XRF, XRD, AAS, OES, Mobile OES, RDE-OES, ICP-OES, LIBS, FTIR, UV-VIS, AFS, Ion Chromatography, and Carbon/Sulfur analyzers. Few suppliers can match this single-source capability — meaning your laboratory gets one trusted partner for every analytical need, simplifying procurement, training, service, and standardization.

Global Standards Compliance

Every Torontech spectroscopy instrument is engineered to comply with the world's most rigorous analytical standards — including ASTM D6595, ASTM D6728, USP <232>/<233>, US EPA methods, ISO, pharmacopoeia testing, RoHS, FDA CFR 21 Part 11, NB/SH/T, HB and GB standards. This compliance ensures your analytical data is universally accepted, regulator-ready, and defensible in audits and third-party reviews.

Cutting-Edge Detector & Optical Technology

Torontech instruments incorporate advanced detector technologies — high-resolution multi-CCD arrays, photomultiplier tubes, SDD/Fast-SDD detectors, solid-state IR detectors, and shaftless photoelectric encoders — paired with proven optical platforms such as Paschen-Runge spectrometers, double-beam UV-VIS optics, and dual-view ICP-OES configurations. The result is exceptional accuracy, sensitivity, and long-term stability.

Intelligent Software & Automation

Every Torontech spectroscopy platform comes with intuitive, modern software that supports automated calibration, real-time spectral processing, comprehensive data management, FDA CFR 21 Part 11-compliant audit trails (where applicable), and easy export to standard report formats. Built-in libraries (e.g., 21 specialized FTIR libraries) accelerate routine workflows, while customizable user features support advanced method development.

Expert Application Support

Torontech's team of application scientists and product specialists is available across multiple time zones to support method development, installation, operator training, calibration, and ongoing technical service. With offices and authorized partners throughout the USA, Canada, UAE, KSA, GCC, EU, India, APAC, Africa, and Latin America, expert assistance is always within reach.

Cost-Effective Value

Torontech delivers premium-grade spectroscopy performance at a transparent, competitive price point — eliminating the inflated cost structures of legacy brands while maintaining the analytical accuracy, durability, and feature set that demanding professionals require. From compact entry-level systems to full research-grade platforms, every Torontech instrument is engineered to deliver outstanding return on investment.

TECHNICAL SPECIFICATIONS

Product Comparison Table

Selecting the right spectroscopy or spectrometry instrument depends on the type of sample, target analytes, required detection limits, regulatory standards, and laboratory workflow. The table below summarizes the twelve flagship Torontech spectroscopy instrument categories — covering elemental, molecular, and ionic analysis — to help you identify the right platform for your application.

Instrument	Technique / Principle	Detection Range / Targets	Key Applications	Standards / Compliance
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XRF / XRD Analyzers	X-Ray Fluorescence & Diffraction — non-destructive elemental & crystal-structure analysis	Mg to U; from ppm to 99.99%; handheld, portable, and benchtop options	Metal recycling, RoHS screening, mining, jewelry, scrap sorting, consumer-product safety, coatings, environmental monitoring	National radiation safety standards; RoHS
AAS — Atomic Absorption Spectrometer (AAS3000 Series)	Absorption of light by free atoms at element-specific wavelengths (flame and/or graphite furnace)	Metals & metalloids; ppm (flame) to ppb (graphite furnace); 1800 grooves/mm grating, 0.1–1.6 nm bandwidth	Geology, mining, metallurgy, agriculture, environmental protection, petrochemical, food & drug safety, third-party testing	USP <232>/<233>, environmental and pharmacopoeia methods
OES — Optical Emission Spectrometer (TT-OES9000)	Spark/arc excitation with Paschen-Runge optical system & multi-CCD detection	Up to 31 elements simultaneously; wavelength 130–800 nm; analysis in seconds	Fe, Al, Cu, Zn, Ti and other metal matrices — foundries, steel mills, alloy QC, PMI, metallurgy	International metal-analysis methods
FTIR Spectrometer	Fourier Transform Infrared — captures absorption spectrum over full IR range simultaneously	Solids, liquids, gases; 21 built-in IR libraries for APIs, pharmaceuticals, polymers, and more	Pharmaceutical raw-material ID, polymer characterization, petroleum, chemical, forensic, academic research	FDA CFR 21 Part 11 (optional)
Carbon & Sulfur Analyzer (TT-CSA1500)	High-frequency induction furnace combustion + solid-state infrared detection of CO ₂ / SO ₂	Carbon & sulfur in solid metals, ceramics, ores, cement, clays; high sensitivity & speed	Metallurgy, foundries, cement, refractories, mining, ceramics, geology	Standard combustion-IR methods for C/S
UV-VIS Spectrophotometer (ToronUV™ VIS Series)	Absorbance / transmittance measurement across UV & visible spectrum (single / split / double beam)	190–1100 nm; bandwidth from 5 nm down to 0.1 nm (double-beam); DNA/Protein modes available	Biochemistry, pharma, environmental water testing, food & agriculture, education & research	Pharmacopoeia testing standards
LIBS Analyzer (TT-LIBS-C)	Laser-Induced Breakdown Spectroscopy — laser plasma excitation of micro-volume	Multi-element simultaneous analysis incl. light elements (Mg, Al, Si); minimal surface impact, no sample prep	On-site alloy grade verification, PMI, scrap sorting, medium-low alloy steel testing	Customizable alloy library bridging international standards

RDE-OES Spectrometers (ToronEA™ Series)	Rotating Disc Electrode Optical Emission Spectrometry — arc excitation of oil sample	Wear metals (Fe, Cu, Al, Cr, Ni, Pb, Sn, Mn, Mo, Ti, Ag) 0–1000 ppm; additives/contaminants up to 6000 ppm; <1 ppm detection limit; <30 s analysis; sample <2 mL	Used-oil analysis, predictive maintenance, condition monitoring — power gen, mining, marine, defense, transportation	ASTM D6595, ASTM D6728, NB/SH/T0865, HB20094.1
ICP-OES (ToronICP™ Series)	Inductively Coupled Plasma — argon plasma >10,000 K excites aerosolized liquid sample	70+ elements simultaneously; ppb-level detection; wide linear dynamic range; axial & radial (dual-view) options	Environmental, metallurgy, petrochemical, food safety, geology, semiconductor, R&D	International environmental and elemental-analysis methods
Atomic Fluorescence Spectrometer (ToronAFS™ Series)	Element-specific excitation with dual-channel fluorescence detection; hydride generation	Hg, As, Se, Sb, Bi, Cd, Pb and related species; sub-µg/L detection limits	Environmental monitoring, food & public-health analysis, geological samples, toxic-metal compliance	Environmental & food-safety regulatory methods
Ion Chromatograph (Toron-IC™ Series)	Ion-exchange chromatography with high-sensitivity conductivity detection (PEEK flow path, pH 0–14)	Anions & cations from ppb to ppm; automatic-ranging conductivity detector	Water analysis, food & beverage, environmental monitoring, petrochemical, pharma, electronics/semiconductor	ASTM, US EPA methods
Mobile OES (ToronOES™ M)	Mobile spark OES on Paschen-Runge platform with digital plasma spark; trolley-based field unit	Multi-element analysis of steels, stainless steels, aluminum & other industrial alloys	On-site PMI, incoming material verification, alloy sorting, weld & component verification in the field	PMI / alloy-verification methods

Each instrument is offered in multiple configurations to match laboratory size, throughput, and budget — from entry-level routine-QC platforms through high-end research-grade systems. The Torontech engineering team works with every customer to specify the ideal combination of detector technology, sample-introduction system, software, and accessories for the targeted analytical workflow.



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