



RDE-OES ELEMENTAL ANALYZER - TORONEA™ 8000

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The RDE-OES elemental analyzer ToronEA™ 8000 delivers rapid, multi-element analysis of lubricating oils, hydraulic fluids, and fuels for maintenance teams, commercial oil testing laboratories, and quality control departments across North America. Built on rotating disc electrode optical emission spectrometry, the instrument identifies wear metals, contaminants, and additive elements directly from an oil sample without dilution or chemical pretreatment. Maintenance engineers and lab technicians rely on the ToronEA™ 8000 to flag developing equipment wear before it turns into unplanned downtime.

A high-resolution holographic diffraction grating and a 500 mm focal length optical system give the ToronEA™ 8000 sub-1 ppm detection limits across 24 elements. A microprocessor-controlled spark power supply captures spectral data with speed and stability, completing a full elemental scan in under 30 seconds. The benchtop footprint suits centralized laboratories and on-site testing stations without sacrificing analytical performance.

Torontech designed the ToronEA™ 8000 for technicians without a chemistry background, pairing straightforward sample introduction with automated data capture through dedicated analysis software. The system prints individual or averaged excitation results, complete with standard deviation and relative standard deviation, supporting a defensible data trail for reliability programs. This mix of accuracy, speed, and ease of use suits commercial oil testing laboratories, industrial maintenance shops, and mobile testing operations alike.

APPLICATIONS

RDE-OES Elemental Analyzer - ToronEA™ 8000 Applications

The ToronEA™ 8000 supports wear metal and contamination screening across industries where equipment reliability and fluid condition drive operating decisions.

- Military and Defense Maintenance: on-site elemental screening of engine and hydraulic system oils supports fleet readiness programs across land, air, and naval assets
- Aerospace and Space Systems: monitors wear metals and contaminants in propulsion and hydraulic fluids where component failure carries significant mission risk
- Electric Power Generation: tracks wear metals and contamination in turbine and generator lubricants to support predictive maintenance schedules
- Transportation and Fleet Operations: screens engine, transmission, and differential oils across truck, rail, and marine fleets to catch component wear early
- Mining and Heavy Equipment: analyzes lubricants and hydraulic fluids from haul trucks, excavators, and processing equipment operating in high-wear environments
- Commercial Oil Testing Laboratories: provides high-throughput multi-element analysis for labs serving industrial, marine, and transportation clients
- Industrial Plant Maintenance: supports condition-based maintenance programs for compressors, gearboxes, and hydraulic systems across manufacturing facilities

Standards

The ToronEA™ 8000 meets the requirements of internationally recognized test methods for rotating disc electrode atomic emission spectrometry, giving lab and maintenance teams results that hold up against industry-accepted benchmarks.

- ASTM D6595 - Standard Test Method for Determination of Wear Metals and Contaminants in Used Lubricating Oils or Used Hydraulic Fluids by Rotating Disc Electrode Atomic Emission Spectrometry

- ASTM D6728 - Standard Test Method for Determination of Contaminants in Gas Turbine and Diesel Engine Fuel by Rotating Disc Electrode Atomic Emission Spectrometry

FEATURES

RDE-OES Elemental Analyzer - ToronEA™ 8000 Key Features

The ToronEA™ 8000 combines optical performance with a workflow built for fast, repeatable results.

- High-Resolution Optical System: a holographic diffraction grating with 2,700 grating lines per millimeter and a 500 mm focal length delivers precise wavelength separation for reliable trace-element detection
- Sub-1 ppm Detection Limit: high-sensitivity spectral hardware detects trace wear metals and contaminants well below typical industry screening thresholds
- 30-Second Test Cycle: completes a full elemental scan in under 30 seconds, supporting high sample throughput in busy testing labs
- High-Speed Data Acquisition: a microprocessor-controlled multi-channel integration system with a 16-bit analog-to-digital converter and high-speed USB interface captures spectral data with speed and stability
- Reagent-Free Direct Testing: analyzes oil samples directly with no pretreatment or chemical reagents, cutting handling time and disposal costs
- Low Training Requirement: simple sample introduction and automated data capture let maintenance technicians run tests without specialized chemistry expertise
- Flexible Analysis Software: create or modify analysis programs, flag results that fall outside the working curve range, and print individual or averaged results from up to 100 excitations with standard deviation and relative standard deviation

THEORY & METHOD

Theory and Method

Rotating disc electrode optical emission spectrometry (RDE-OES) measures the elemental composition of an oil sample by generating a controlled electrical discharge between a rotating graphite disc and a counter electrode. The disc rotates through the sample, picking up a thin film of oil on its edge. As the disc turns past the electrode gap, a high-voltage spark repeatedly arcs across the film, vaporizing and exciting the metal atoms and ions present in the oil.

Excited atoms release energy as light at wavelengths characteristic of each element, the same physical principle behind atomic emission spectroscopy in general. The ToronEA™ 8000 directs this light through a holographic diffraction grating, which separates the combined light into its component wavelengths across a 500 mm focal length optical path. A detector array measures the intensity of light at each wavelength, and the analysis software converts those intensities into elemental concentrations using a calibration curve built from certified reference oils.

Continuous disc rotation refreshes the sample film with each revolution, so the spark always strikes a fresh layer of oil. This design lets the ToronEA™ 8000 read wear metals, contaminants, and additive elements directly from the raw sample, without the dilution, digestion, or nebulization steps that plasma-based techniques require.

TECHNICAL SPECIFICATIONS

RDE-OES Elemental Analyzer - ToronEA™ 8000 Technical Specifications

Parameter	Specification
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Optical System	Holographic diffraction grating, 2,700 grating lines/mm
Focal Length	500 mm
Spectral Range	130-800 nm (determined by diffraction grating selection)
Detection Limit	Less than 1 ppm
Test Cycle Time	Under 30 seconds per sample
Data Converter	16-bit analog-to-digital converter
Controller	Mixed-signal flash microcontroller, 100 MHz
Interface	High-speed USB
Power Source	220V $\pm$ 10%, single phase, 50/60 Hz, 10 A, 1.5 kVA
Dimensions (L $\times$ W $\times$ H)	860 $\times$ 470 $\times$ 620 mm
Weight	95 kg

Detectable Elements and Range

Element	Detection Range (ppm)	Element	Detection Range (ppm)
Fe (Iron)	0-1,000	Ba (Barium)	0-6,000
Cr (Chromium)	0-1,000	P (Phosphorus)	0-6,000
Pb (Lead)	0-1,000	Zn (Zinc)	0-6,000
Cu (Copper)	0-1,000	Mo (Molybdenum)	0-1,000
Sn (Tin)	0-1,000	Ti (Titanium)	0-1,000
Al (Aluminum)	0-1,000	V (Vanadium)	0-1,000
Ni (Nickel)	0-1,000	Mn (Manganese)	0-1,000
Ag (Silver)	0-1,000	Cd (Cadmium)	0-1,000
Si (Silicon)	0-1,000	Sb (Antimony)	0-1,000
B (Boron)	0-1,000	Li (Lithium)	0-1,000
Mg (Magnesium)	0-6,000	Na (Sodium)	0-1,000

Ca (Calcium)	0-6,000	K (Potassium)	0-1,000
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