TORONTECH

FULLY AUTOMATIC KARL FISCHER COULOMETRIC MOISTURE ANALYZER

Fully Automatic Karl Fischer Coulometric Moisture Analyzer – ToronKFC™ MA

ToronKFC™ MA is a fully automatic Karl Fischer coulometric moisture analyzer designed to precisely determine trace moisture content in solids, liquids, and gases across a wide range of chemical matrices. Built on the coulometric Karl Fischer titration principle, this instrument delivers high measurement accuracy, rapid analysis speed, stable and reproducible results, and effective suppression of interference from high-boiling-point substances.

The Karl Fischer moisture titrator features a 28-position sample loading tray, a Windows-based software platform with a user-friendly interface, and full automation of reagent balance, injection, carrier gas management, and result calculation. A small integrated heating chamber with intelligent temperature control and a high-precision pipe heating unit (room temperature to 150 °C, ±0.1 °C accuracy) ensure uniform headspace vaporization for solid and high-viscosity samples.

APPLICATIONS

Fully Automatic Karl Fischer Coulometric Moisture Analyzer – ToronKFC™ MA Applications

The ToronKFC™ MA coulometric Karl Fischer titrator connects directly to LIMS systems and is suitable for petroleum, chemical, pharmaceutical, power, and environmental laboratories.

- Rapid moisture determination in alcohols, oils, fats, ethers, esters, acids, and alkanes
- Moisture analysis of benzene derivatives, amines, organic solvents, pesticides, and phenols
- Water content testing in raw materials for pharmaceuticals and fine chemicals
- Moisture measurement in petroleum products, lubricants, and transformer oils

- Quality control of chemical and polymer manufacturing intermediates
- Environmental analysis and power sector monitoring requiring trace water detection
- Process laboratories requiring LIMS-integrated, automated batch moisture testing

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ToronKFC™ MA
Full-Automatic Karl Fischer Coulometric Moisture Analyzer

FEATURES

Fully Automatic Karl Fischer Coulometric Moisture Analyzer – ToronKFC™ MA Key Features

- All-in-one Windows-based platform with user-friendly HMI and direct LIMS connectivity for integrated laboratory workflows
- 28-position sample loading tray enabling independent temperature setting for each sample position, supporting unattended batch analysis
- Real-time display of drift, water content, potential value, test curve, and temperature for each sample position
- Fully automated testing process — reagent balance, injection and removal of sampling needles, carrier gas control, and result calculation require no manual intervention
- Real-time stirring monitoring prevents iodine adhesion to the electrolytic electrode, maintaining consistent cell performance
- Integrated heating chamber with high-precision intelligent temperature controller and adjustable heating rate for uniform sample vaporization
- 5 mL disposable headspace vial — low in cost, easy to use, and minimizes cross-contamination between samples
- High-precision pipe heating unit with temperature range from room temperature to 150 °C and ±0.1 °C control accuracy
- Self-diagnosis function for fault detection, improving after-sales service efficiency and minimizing instrument downtime
- Electrolytic current range 0–400 mA with 0.1 µg resolution for trace-level moisture detection
- Wide measurement range 1 µg – 100 mg covering both ultra-trace and moderate moisture levels in a single instrument

THEORY & METHOD

Theory and Method

The ToronKFC™ MA operates on the coulometric Karl Fischer titration method. In coulometric KF titration, iodine is electrochemically generated in situ at the anode of the electrolytic cell from iodide ions contained in the Karl Fischer reagent. The generated iodine reacts stoichiometrically with water present in the sample according to the Bunsen reaction:

$I_2 + SO_2 + H_2O + 3\ (base) \rightarrow 2\ HI(base) + SO_3\ (base)$

Because iodine generation is governed by Faraday's law (1 mole of I_2 requires 2 × 96,485 coulombs), the total charge passed is directly proportional to the water content of the sample. This approach eliminates the need to prepare or standardize iodine titrant solutions, making it particularly suited to trace moisture determination (1 µg – 100 mg range). Real-time stirring monitoring prevents iodine adhesion to the electrode. Samples are introduced via a 5 mL disposable headspace vial; the heating chamber vaporizes moisture from solids and viscous samples before transfer to the titration cell via carrier gas.

TECHNICAL SPECIFICATIONS

Fully Automatic Karl Fischer Coulometric Moisture Analyzer – ToronKFC™ MA Technical Specifications

Parameter	Specification
Titration Method	Coulometric Karl Fischer
Measurement Range	1 µg – 100 mg

Parameter	Specification
Accuracy	≤ 3 μg deviation for 10 μg – 1 mg samples; ≤ 0.3% deviation for samples > 1 mg
Resolution	0.1 μg
Electrolytic Current	0 – 400 mA
Flow Rate	0 – 320 mL/min
Temperature Control	Up to 280 °C
Temperature Control Accuracy	0.1 °C
Pipe Heating Range	Room temperature to 150 °C, accuracy ±0.1 °C
Sample Capacity	28 positions (independent temperature setting per position)
Headspace Vial	5 mL disposable
Platform	Windows-based software
Voltage	AC 220 V ± 10%, 50 Hz (110V is also available)
Relative Humidity	< 80% RH
Ambient Temperature	5 – 45 °C
Other Notes	No strong vibration, airflow, strong electromagnetic interference, or corrosive gases near instrument

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