

Automatic Karl Fischer Titrator (KAFI+)



Automatic Karl Fischer Titrator & KAFI⁺

Karl Fischer titration is an accurate, rapid and efficient method for determining the water content in samples. When the sample is titrated in the presence of SO_2 , I_2 , and an organic base, moisture from the sample extracted in the solvent, can be quantitatively estimated. Dry methanol is used as a solvent in Karl Fischer titration.

The indicator-electrode is a two-pin platinum electrode across which a constant current is generated by a polarizing current source. For starting, very low volume of methanol as a solvent is needed in the specially designed vessel.

Background signal correction is done through an offset mode.

Calculated doses of Karl Fischer reagent are added to the solution in a hermetically sealed vessel as per stop criteria selected and the end-point volume is evaluated automatically. The instrument continuously monitors moisture leak in the vessel and neutralizes it automatically. The built-in reagent standardization procedure by water (H_2O) or Sodium Tartrate ($\text{C}_4\text{H}_4\text{Na}_2\text{O}_6 \cdot 2\text{H}_2\text{O}$) for titre factor/concentration (F) is incorporated.

The liquid handling path comprises teflon tubing, teflon-lined valve, and a gas tight syringe with teflon plunger. It creates a chemically inert system for this highly sensitive analysis.

The magnetic, adjustable-speed stirrer is a part of the system in which the sample is stirred vigorously to extract the moisture efficiently.

The result, including the leak rate, is printed in a tabulated form and is also displayed on back lighted liquid crystal display (LCD) screen.

MODES OF OPERATION

Karl Fischer titration is a dead stop titration process which monitors the mV drift to be lower than the stop band, and the end of the titration is detected when the leak rate is close to or less than stop band. The leak rate is displayed and also printed. There are two main modes of operation:

- In minimum dose mode where the end dose is same as the minimum dose, the titration will be stopped when the mV does not rise above the stop band in specified delay time.
- In drift mode, the titration will be stopped if the calculated drift value is less than or equal to entered drift value in $\mu\text{l}/\text{min}$.

APPLICATIONS

- Pharmaceutical
- Food and Beverages
- Petrochemicals
- Cosmetics
- Organic / Inorganic Chemicals etc.



FEATURES

- Advanced Microcontroller based user-friendly, state-of-the-art product design with alphanumeric splash waterproof polyester soft keys for keyboard. User interactive software in dialogue mode for ease of operation with protection against invalid entries.
- Quick interchangeable imported burette assemblies with intelligent recognition for its volume size. Burette validation factor for dispensing correction is available for true end point volume.
- Alphanumeric entry of Sample Name & Identification Number with Date and Time for authentication. Daily Auto Incremented Run number and Factory entered CUSTOMER NAME & Instrument Sr. No. on report printouts make the system foolproof and GLP compliant.
- Quick monitoring, and automatic neutralization of moisture leak into vessel to keep it ready for next titration.
- End point delay up to 100 sec for slow moisture releasing samples.
- Titration run can be started with last run parameters.
- On line leak rate correction available.
- Microcontroller based variable speed, magnetic stirrer with digital indication.
- **Calculation modes :**
 - Weight /Weight
 - Volume/Volume
 - Volume/Density
- **Selectable report format, complying with GLP requirements :**
 - A) Report giving titration parameter and result.
 - B) Report of method parameters.
 - C) Condensed report of titration parameter and result.
 - D) Statistics report for last 10 repeat run analysis.

Reports can be obtained even after resetting / power off / power failure conditions.

- Statistic function with run selectivity for finding Mean, S.D., R.S.D. and C.V. of last 10 repeat run results could be viewed or printed.
- Storage of last ten results with reprocessing facilities.
- ASTM standard compliant for analysis of oil samples.
- Real Time Clock (RTC) for Date & Time display and report printout with run time indication.
- Balance interface to directly transfer the sample weight.
- Two tier - a) ADMIN and b) USER password protection for method editing.
- **Optional :**
 - IQ, OQ, PQ, documents available
 - Data downloading facility to PC via 21CFR compliant EDC21 software.

SPECIFICATIONS

- Principle : Karl Fischer method of volumetric water determination.
- Control : Microcontroller based.
(Advanced version of microprocessor).
- mV range : ± 3200 mV.
- Accuracy : ± 1 mV.
- End point detection : Voltametric.
- Polarising Current Range : $1 \mu\text{A}$ to $80 \mu\text{A}$ in 8 steps.
User selectable, method parameter entry through keyboard.
- Cut-off criteria : Delay or drift - user selectable.
- Measuring Range : $10 \mu\text{g}$ to 500 mg (10 ppm - 100%).
- Sensor : Dual pin platinum electrode.
- Sensor input : (Imported) Through special TNC connector.
- Burette : 5ml or 10ml capacity, interchangeable,
with auto recognition.
- Burette resolution : $1/20000$ for 10 ml Volume.
- Burette Volume : 5 ml & 10 ml available.
- Filling time : $< 20 \text{ sec}$.
- Stirrer : Magnetic capsule type, microcontroller based speed
control with digital indication.
- Keyboard : Alphanumeric splash waterproof polyester soft keys.
- Display : 40×2 line back lighted, liquid crystal display (LCD).
- Data Storage : Non volatile memory to store 50 methods &
last 10 reports.
- Method Storage : 50 methods with parameters.
- Results : mg/ml , $\%$, ppm , mg/g and on-line leak rate with
cumulative titrant consumption.

REPORT FORMAT :

- Method parameter.
 - Titration analysis report.
 - Titration analysis condensed report.
 - Statistics and on-line leak rate report.
- Input/Output peripheral interface :
 - Parallel Port : 1 No. for printer
 - Serial Port : 2 Nos. for Balance & PC.
 - Power requirement : $230 \text{ V AC} \pm 10 \%$, 50 Hz .
 - Environmental Operating Conditions :
 - Operation : Indoor
 - Temperature : Ambient to $45 \text{ }^\circ\text{C}$
 - Humidity : 5 to 90% non-condensing.
 - Drying Oven
 - Temp : Ambient + 10 to $350 \text{ }^\circ\text{C}$
 - Power requirement : $230 \text{ V AC} \pm 10\%$, 50 Hz

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