Auto Titrator

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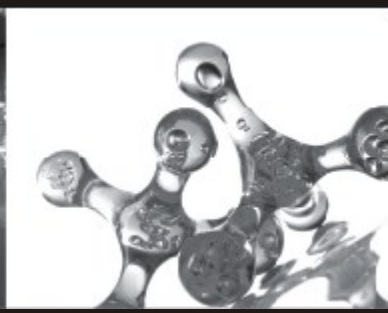

Titration is the fundamental chemical analysis procedure whereby concentration of chemical substance in solution is determined by reacting it with measured amount of another chemical. Auto titrator performs this analysis using motor driven dispenser, stirred reaction vessel and electrodes which sense the completion of reaction by measuring the potential difference between two electrodes. Making use of this instrument, it is possible to increase the accuracy, repeatability, reproducibility and minimize the errors in calculation and documentation.

The instrument provides following modes of Titrations :

- **Incremental :**

Incremental titration operates with user selectable fixed dose and fixed intervals till the end point is detected or volume limit is reached.

- **Equilibrium :**

This is universal and dynamic titration. In this titration the dose and time automatically get tuned to the titration trend with evaluation of end point.

- **pH Cut-off/STAT :**

a) In pH cut-off mode, the end point is determined in a pre-selected pH window.

b) In pH-STAT mode, the pH value is maintained until the pre-selected time interval is fulfilled.

The following Titrations are possible with TITRA

- Acid-base or aqueous titration
- Redox titration
- Complexometric titration or EDTA titration
- Blank titration
- Silver Assay Titrations (As per BIS 2113 : 2002)
- Nonaqueous titration
- Argentometric or Precipitation titration
- Voltametric titration / KF Titration
- Back titration

Applications

- Pharmaceuticals and Bio-Chemistry
- Food and Beverages
- Pesticides and Fertilizers
- Metallurgy and Electroplating
- Environmental and Water Pollution
- Dyes and Chemicals
- Petrochemicals, Plastics and Polymers
- Jewellery Industry

TITRA is provided with two-point auto calibration and standardisation (zero offset). The instrument is capable of displaying pH and mV of the sample, with temperature compensation. TITRA can accept a variety of electrodes to cater to various applications in different fields. The liquid path comprises Teflon tubings,Teflon lined valve and gas tight burette with Teflon plunger head. It creates chemically inert system for any sensitive analysis. The instrument is supplied with high speed vortex stirrer with digital speed indication. This specially designed stirrer provides excellent homogenous mixing of samples. An optional magnetic stirrer is also available.

Result Calculation

TITRA has user selective end point result calculation as follows :

a) Result calculation by highest potential jump

b) Result calculation by last potential jump

c) Result calculation with selected potential jump

d) Result calculation with potential jump in window of selected parameters For example – TAN/TBN analysis.

Features

- Advanced Micro controller 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.
- Vortex stirrer for vigorous and homogenous stirring with specially designed glass propeller for total chemical inertness.
- Quick interchangeable imported burette assemblies with intelligent recognition for its volume size. Burette factor for dispensing corrections is available for true end point calculations.
- Composite Differential Electrode Amplifier unit for Potentiometric and Voltametric/KF Titrations, having connectivity to various Electrodes. Temperature Sensor with 4-line measurement technique ensures correct temperature indication.
- Three standardised modes of titration, namely incremental, equilibrium and cut- off by pH mode to perform almost all types of titration. By selecting titration method, instrument prints the type of appropriate electrode.
- During titration, the measured variable i.e. electrode potential (mV) or the pH value is shown on the display together with dispensed volume and number of End Points (EP) detected.
- User selectable End Point (EP) evaluation up to 9 EP during the run, and calculation by first, last, largest, all or selected EP with display of results and printout.
- Alphanumeric entry of Sample Name, Titrant Name, Identification Number, Date with type of Electrode used for authentication. Daily Auto Incremented Run number and Factory entered CUSTOMER NAME and Instrument Sr. No. on report printouts make the system foolproof and GLP compliant.
- Facility to use as a dispenser for fixed volume dosing or dilution allows to perform manual titration with user defined dose and mV indication.
- Predispense facility with selectable dose and time for quick titrant addition without disturbing the titration trend.
- Automatic evaluation of molarity for standardisation of titrant, storage of 20 molarities and their retrieval for calculation.
- Compliant to ASTM D664, D2896 & D4739 for TAN and TBN analysis for oil samples.
- Titrant temperature factor for volume correction.
- Result recalculation facility to obtain printout in different units such as molarity, factor, % assay (wt), % volume (ml), ppm, mg/l, mg/g, ml/g, g/l, meq/l, mol/kg, TAN & TBN for oil samples.
- Reprocessing of threshold and recalculation of EP without performing the new run.
- 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.
- User Programmed selectivity for report format, complying with GLP requirements:
  - a) Report giving parameter and result.
  - b) Data table giving mV, pH, mV, mV/ml, 2nd derivative and volume (µl).
  - c) Graphics report giving mV v/s µl titration curve.
  - d) Graphics report 1st derivative graph v/s µl titration curve.
  - e) Graphical report of 2 derivative curve.
  - f) Report of method parameters for 50 methods.
  - g) Condensed report of titration parameters and results.
  - h) Auto evaluation report for multi EP samples - EP1, EP2-EP1 etc. available.

The reports can be obtained even after resetting/power off/power fail conditions.

- Real Time Clock (RTC) for 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.
- TITRA can be converted to perform Karl Fischer titrations by simply changing burette assembly. All the specifications of LABINDIA Karl Fischer Titrator are applicable.

Optional :

- Availability of optional in situ accessory to perform titrations from 5°C to 80°C.
- Data down loading facilities to PC with window based PC Titra software.
- IQ, OQ, PQ, documents available.

Specifications

- **Principle :** Volume determination by equivalence point, end point or pH STAT.
- **Control :** Microcontroller based (Advanced version of microprocessor).
- **mV range :** ±3200 mV.
- **Accuracy :** ±0.1 mV (±0.0016 pH).
- **Amplifier input impedance :** > 10 ohms
- **Burette Resolution :** 1/5000 for 5 ml, 1/10000 for 10 ml, 1/5000 for 25 ml.
- **Filling time :** <20 sec.
- **Keyboard :** Alphanumeric splash waterproof polyester soft keys.
- **Display :** 40 x 2 line back lighted liquid crystal display (LCD).
- **Titration Head :** (a) Manual stand with swivelling arm.
- **Stirrer System :** Microcontroller based variable speed, high torque vortex stirrer with digital indication. Magnetic Stirrer optional.
- **Sensors :**
  (1) Electrodes for Potentiometric titration - (pH, Ion, Redox, Argentometric).
  a) Any combination electrode.
  b) Differential Electrode System comprising sensing (Indicator) Electrode with BNC Connector and Reference Electrode with 4mm Banana Connector.
  (2) Electrode for KF/Voltametric titration with BNC/TNC Connectors.
  (3) Temperature sensor (PRT/PT100)
- **Calibration :** 3-point Calibration with user entered buffer values and standardisation with 7 pH buffer.
- **End Point detection : a)** Potentiometric, **b)** Voltametric, **c)** Thermometric and Photometric.
- **Cut-off criteria : a)** Volume **b)** End point **c)** mV/pH.
- **Methods :**
  1) Titrations - **a)** Acid base, **b)** Nonaqueous. **c)** Redox d) Preciptiation **e)** Complexometric **f)** back titration
  2) KF titration (Optional)
- **Results : a)** Molarity **b)** % Assay (wt) **c)** % volume (ml) **d)** ppm **e)** mg/l **f)** mg/g **g)** g/l **h)** meq/l **i)** mol/kg **j)** TAN and TBN for oil samples.
- **Method Storage :** 50 methods with parameters.
- **Titrant Molarity storage :** 20 values
- **Report Format : 1)** Method Parameters **2)** Titration analysis report **3)** Titration analysis condensed report **4)** Titration data table
  5) Titration graphic report - **i)** µl v/s mV **ii)** µl v/s First derivative **iii)** µl v/s Second derivative **iv)** µl v/s Time
  6) Auto evaluation report **7)** Statistics report **8)** End Point Titration report **9)** Calibration report.
- **Input/Output Peripheral Interface : (a)** Parallel Port : 1 No. - for printer **(b)** Serial Port : 2 Nos. - for Balance & PC.
- **Power :** 230 V AC ± 10%, 50 Hz.
- **Environmental Operating Conditions : a)** Operation : Indoor **b)** Temperature : Ambient to 45°C **c)** Humidity : 5 to 90% non-condensing.

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