Karl Fischer
Titrator (KF)

LABINDIA®

Aiming for the Best

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 ($C_4H_4Na_2O_6 2H_2O$) 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:
(a) 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.

(b) In drift mode, the titration will be stopped if the calculated drift value is less than or equal to entered drift value in l/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 down loading facilities to PC.

Printout

Various printouts in different formats are available. Printouts can be selected as per your requirement. Some of the sample printouts are shown here.

PRINTOUT OF METHODS PARAMETERS

11:10:23		02/05/07

METHOD NO	:	46
MODE	:	CONCENTRATION
E.P. FACTOR	:	30
DRIFT TYPE	:	Final
STIR TIME	:	10 Sec
Sample Name	:	Water

MINIMUM DOSE	:	Off
DRIFT	:	10 ul/mn
CURRENT SETTING	:	6 (16 A)
BLANK VOL	:	0.000 ml

METHOD NO	:	47
MODE	:	CONCENTRATION
E.P. FACTOR	:	30
DRIFT TYPE	:	Final
STIR TIME	:	180 sec
SAMPLE NAME	:	NA Tartrate

MINIMUM DOSE	:	Off
DRIFT	:	10ul/mn
CURRENT SETTING	:	6 (16 A)
BLANK VOL	:	0.000 ml

METHOD NO	:	49
MODE	:	PERCENTAGE
E.P. FACTOR	:	30
DRIFT TYPE	:	Final
STIR TIME	:	180 sec
SAMPLE NAME	:	NA Tartrate

MINIMUM DOSE	:	Off
DRIFT	:	10ul/mn
CURRENT SETTING	:	6 (16 A)
BLANK VOL	:	0.000 ml

K.F. TITRATION ANALYSIS REPORT

10:36:58 19/05/07 #5

Instrument Sr. No.	:01
Burette Size	:10 ml
Burette Factor	:1.0000
Run Time (mm:ss)	:03:13

METHOD PARAMETERS :

Method No.	:2
Method	:Detection of Moisture
Sample Name	:Methanol
Drift (Ini)	:10ul/mn
E.P. Factor	:30
corr. stop band	:31
Current Setting	:6 (16 A)
Stir time	:10 sec
Blank Volume	:Not Applicable

SAMPLE ANALYSIS PARAMETERS :

Concentration	:5.3321 mg/ml
Sample Volume	:10.000 ml
Specific Gravity	:0.790
Identification No	:M1
K.F. Vol (Net)	:0.220 ml
Result	:0.0148 % of Moisture

Signature :_____

Name:_____
Analysis done on Labindia TITRA

| DATA TABLE		#18
K.F. Volume (ml)	Elapsed Time (min)	Leak (l/min)
0.005	1	5
0.005	2	2
0.010	3	3
0.010	4	2
0.010	5	2
0.014	6	2
0.014	7	2
0.014	8	1

Accessories

1   **BURETTE INTERCHANGEABLE UNIT :** Burette change accessory facilitates the user for quick change over to other burette assembly with different volume (size) or different titrant eliminating the time consuming process of cleaning and rinsing of burette and connecting tubes.

2   **FILTER DRYERS :** LABINDIA designed the Filter Dryers to suit and match with the design of TITRA and KAFI. They are typically filled with silica gel and molecular sieve.
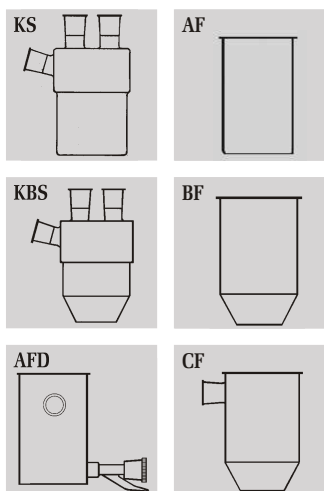
3   **KF VESSEL :** Various types of KF Vessels are available depending upon sample introduction requirements, as shown in the picture.

Type	Inlets	Electrode & Dispensing Tip Mounting	For use with Magnetic Stirrer Model	Remarks
KS	4 Top 1 Side	Directly on vessel	A	General Purpose.
KBS	4 Top 1 Side	Directly on vessel	A	General Purpose, but when sample size is small.
AFD	Open Top with drain	On electrode holder arm	B	For General Purpose, but with drain requirements.
AF	Open Top No Side	On electrode holder arm	B	General Purpose.
BF	Open Top No Side	On electrode holder arm	B	General Purpose, but when sample size is small.
CF	Open Top 1 Side	On electrode holder arm	B	General Purpose, suitable for side entry of sample.

4   **MAGNETIC STIRRER WITH HOLDING RING (Model A) :** Magnetic Stirrer is essential for vigorous stirring of any sample at an optimized speed for reproducible results, particularly for samples where stirring from top is not possible. For example, stirring in Karl Fisher Titration Vessel.

Labindia Magnetic Stirrer is a microcontroller based instrument with digital speed indicator, which ensures stable stirring speed.

5   **MAGNETIC STIRRER WITH ELECTRODE ARM (Model B):** Similar to item no. 4 above with electrode holding arm. This is used with flanged open top vessels, with clamping facility. This ensures hermetic sealing for zero leak of air.

6   **FILL/DRAIN PUMP :** Fill-Drain Pump is a stand-alone unit with separate drain and fill ports. It is used for siphoning foul smelling or harmful chemicals used in KF analysis from the titration vessel facilitating the easy disposal of waste, and additional fresh solvent filling facility for safe and easy operation.

7   **DRYING OVEN :** Drying Oven is an accessory for determination of moisture with Karl Fischer Titrator. Moisture estimation of the substances which react with K.F. reagent is not possible by direct titration with K.F. reagent. This difficulty can be overcome by heating such samples in oven and expelling the moisture by evaporation in to the K.F. vessel containing methanol by dry inert gas. The trapped moisture can be titrated with K.F. reagent.

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 A to 80 A in 8 steps. User selectable, method parameter entry through keyboard.

◗ **Cut-off criteria** : Delay or drift - user selectable.

◗ **Measuring Range** : 10 g to 500 mg.

◗ **Sensor** : Dual pin platinum electrode.

◗ **Sensor input** : (Imported) Through special TNC connector.

◗ **Burette** : 5ml or 10ml capacity, interchangeable, with auto recognition.

◗ **Burette resolution** : 1/5000 for 5 ml and 1/10000 for 10 ml.

◗ **Filling time** : < 20 sec.

◗ **Stirrer** : Magnetic capsule type, microcontroller based speed control with digital indication.

◗ **Keyboard** : Alphanumeric splash waterproof polyester soft keys.

◗ **Display** : 40 x 2 line back lighted, liquid crystal display (LCD).

◗ **Data Storage** : Non-volatile memory.

◗ **Method Storage** : 50 methods with parameters.

◗ **Results** : mg/ml, % , ppm, mg/g and on-line leak rate with cumulative titrant consumption.

◗ **Report Format :**
a) Method parameter.
b) Titration analysis report.
c) Titration analysis condensed report.
d) Statistics and on-line leak rate report.

◗ **Input/Output peripheral interface** :
(a) Parallel Port : 1 No. for printer
(b) Serial Port : 2 Nos. for Balance & PC.

◗ **Power requirement** : 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.

◗ **Drying Oven**
a) Temp : Ambient + 10 to 350°C
b) Power requirement : 230 V AC $\pm$10%, 50 Hz

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GA/500/02/08

Striving to become the best individuals, we endeavour to foster the best team. Performing sensibly, we try to achieve the best efficiency. Working innovatively, we seek to make the best products. Listening patiently, we excel to offer the best service. So, no matter what your needs are, come to us, GET THE BEST.