Instruction & Operation Manual

Microcontroller Based
Karl Fischer Titrator
Model: µAquaCal$_{10+}$

Version Number : _____

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1. Introduction

The μAquaCal$_{10}$+ is an advance Microcontroller Based Karl Fischer Titrator offers fast and accurate measurements at a value price for routine Moisture measurements in Solid, Liquid or semi liquid samples by using volumetric Principal. Reagent addition is precisely done with Microcontroller based controlled Stepper Motor dispenser for accurate determination of Moisture. μAquaCal$_{10}$ is having facility to Drain (Optional), Flush & Auto Neutralization.

The μAquaCal$_{10+}$ is an extremely easy-to-use MICROCONTROLLER BASED Karl Fischer Apparatus.

1.1. Principal of Operation:

The Sample is dissolved in a solvent that is contained in a moisture free vessel and titrated with the KF Solution. The unknown water content of the sample is determined by measuring the volume of KF Solution required reaching the end point of the Titration the Water Content is determined.

Water Content = (Consumption of KF Solution in ml. x Titer Value of KF Solution)

Initially the water equivalent factor or titer of the Karl Fischer solution has to be determined. It is usually measured in mg of water per ml of Karl Fischer Solution. It is found out by titration a known quantity of water with the Karl Fischer solution up to the endpoint.

Titer Value = mg of water / ml. of KF Solution.

1.2. Instrumentation:

The sample whose water content is to be determined is transferred into the reaction vessel that is mounted on top of the stirrer. It is titrated against the KF reagent that is contained in the Amber Bottle. Dispensing of KF reagent from Bottle to Vessel done by motor, which controls the drops from the bottle. A Magnetic Stirrer continuously stirs the sample. A Dual Platinum electrode dipped in the sample Solution monitors the reaction. The mV signal from the electrode is continuously compared against an endpoint Voltage by the highly sensitive electronic circuit. (The END POINT voltage is prefixed and is the voltage when the sample solution is moisture free.) The electronic circuit also controls the rate of reagent delivery from the reagent bottle depending on the difference between the input voltage signal and the end point voltage. As the endpoint approaches the reagent delivery is slowed down by the circuit. At the endpoint the delivery of KF solution is stopped and the electronic circuit will monitor the reaction for a fixed period called as the HOLD time. (Approx. 20 Sec.)

If the endpoint is stable for the duration of the Hold time, the instruments will give buzzer indication and ml of KF consumption displays on screen.

2. Environmental Condition

The Instrument can operate within temperature and relative humidity conditions of 0°C to 55°C and 5 to 95 % respectively. However, an environment comfortable for human habitation (reasonable constant temperature and humidity conditions) is recommended for optimum performance and instrument lifetime.

Exposure to corrosive substances (weather gas, liquid or solid) may affect materials and components used in instrument and should avoid.

3. Installation Prerequisites

Power Supply Requirements:

1) Stabilized Power supply 230VAC ± 10 %, 50Hz.
   (Earthing voltage should be **less than 3V AC** – between Earthing & Neutral)
2) One 5 Amp. Point requires for Main unit.

Chemicals and Accessories Required:

a. Karl Fischer Reagent - 250 ml
b. Dried Methanol (KF Grade) - 250 ml
c. Distilled Water - 50 ml
d. Dropper Bottle OR 10 µL syringe for calibration
e. Dry Di sodium Tatrate (DST) - 250 gms.
f. Analytical Balance (0.1 mg accuracy)
g. Tissue Paper Roll
h. Butter paper for solid samples analysis
i. Wash Bottle – 500ml – 1 No
j. Waste Bottle for drain output
k. Calculator

Location

The µAquaCal$_{10}$ requires a conventional laboratory bench 50 cm. long, 40 cm. Deep.

4. Packing List

Sr. No.	DESCRIPTION	QTY	Packed √ | X
01	Microcontroller Based Karl Fischer Titrator Model: µAquaCal$_{10+}$ Make: ANALAB	01	
02	250 ml Reaction Vessel	01	
03	Dual Platinum combined Electrode	01	
04	Teflon Paddle	01	
05	Teflon assembly	01	
06	Moisture Trap	02	
07	250 ml Amber Reservoir Bottle	01	
08	Dispensing Tube	02	
09	Micro Tips	02	
10	Teflon tube for dispensing path	01	
11	Silicon Tube – 6 mm for Drain (0.5 Meter)	01	
12	Silicon Tube – 3 mm for Air input (0.5 Meter)	01	
13	Power cord	01	
14	Operational & Instruction manual with SOP	01	
15	Calibration test certificate (Without Traceability Documents)	01	
16	Warranty card	01	
Optional Item (If ordered)			
17	Keypad Screen Guard (Attach with Keypad)	01	
18	DQ /IQ/OQ/PQ Documents	01 Set	

Serial No.: _____ Packed By: _____

Unpacking Procedure

a. Open the box to indication arrow.
b. Take out the bonded Accessories carefully.
c. Take out Instrument carefully.
d. Install the unit according to procedure of installation.

5. Technical Specifications

- Method of Detection : Conductometric / Volumetric
- Range of Moisture Detection : Better than 100 ppm to 100% (depends upon type of sample)
- Dispensing Resolution : 0.01ml
- Magnetic Stirrer : Built-in with soft touch Key speed controller
- Auto Neutralization : On / Off - users selectable - reduces the time between analysis & gives accurate results
- Stirring Time : 00:00 to 99:00 (mm:ss) – users adjustable
- End Point Sensitivity : 80-100 - users adjustable
- End Point Time : 1-20 seconds - users adjustable
- End Point mV : 1000-3000 mV - users adjustable
- End Point Detection : By Audio & Visual Alarm
- Over titration Alarm : Audio / Visual Alarm at 15 ml to save KF Reagent
- Display of Reading : Moisture in ppm & percentage (%)
- Auto Drain : For cleaning reaction vessel - useful for large & multiple volume sample
- Flush : For cleaning dispensing path
- Average KF Factor : Manual Calculation
- Dispenser Calibration : Onsite by users
- Dispenser MOC : SS-316L & Teflon
- Dispenser Type : Motorized
- Teflon Tube : To transfer KF reagent from reagent bottle to reaction vessel
- Material of Construction : Epoxy Based Powder Coated Metallic Body / GMP Enclosure made up of Stainless Steel
- Type of Electrode : Dual Platinum - Combined Type
- Input : Electrode with Banana Connector
- Error Messages : “Over KF”, “KF Factor Error”
- Short Link : Provided to diagnose the problem either with Instrument OR Electrode
- Display : 16 x 2 Line Alphanumeric Backlit LCD
- Keypad : Membrane waterproof polycarbonate soft touch keypad compliance to UL/ROHS
  by scrolling.
- Power Supply : 230VAC ±10%, 50 Hz

6. Description of Keypad

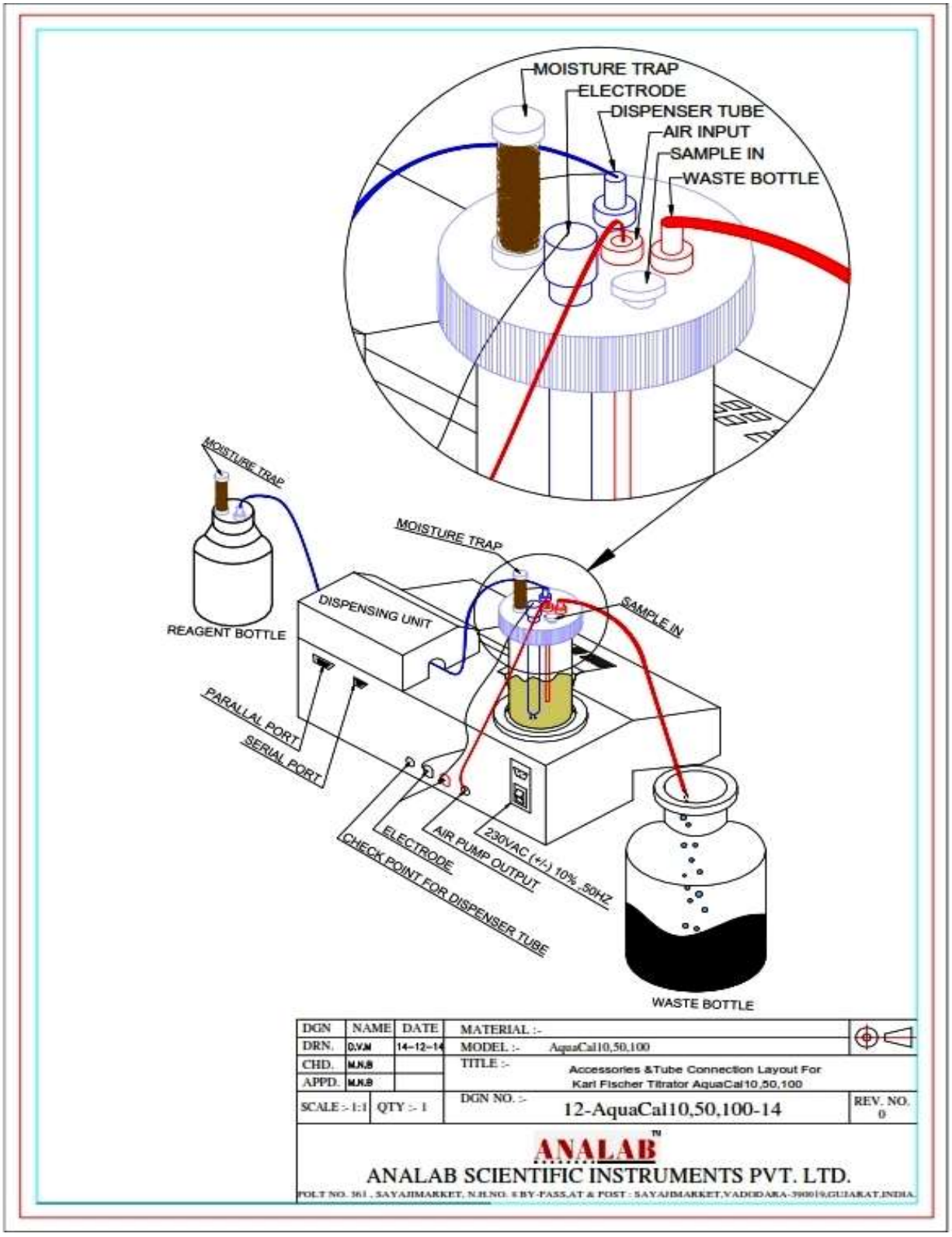
µAquaCal$_{10+}$ is having EIGHTEEN keys with 16 x 2 Backlit LCD that are distributed in three parts.

- **Number Keys** : To Enter values or mode number
- **Mode** : To select different mode to set parameters
- **Flush** : To Flush the dispensing path with solvent
- **Drain** : To Drain the vessel (Long press)
- **Start** : To start analyses
- **Stop** : To stop analyses manually
- **Enter** : To confirm or to select command or Value.
- **Esc** : To come out from menu or submenu at any time.
- **▲ / ▼** : To scroll display and to increase or decrease the speed of stirrer.
- **STIRRER ON/OFF** : To start / stop stirrer (with LED indication)

7. Description of Rear Panel

- Power Supply : To connect Mains Power Cord
- Electrode : To connect Dual Platinum Electrode
- KF Reagent Spillage outlet : To drain KF Reagent/methanol in case of puncture in Internal dispensing tube.

8. Accessories & Tube Connection Layout



9. Installation

Install the unit in a place, which is free from dust and water vapours. Fix the instrument in a table or platform. Dry the reaction vessel thoroughly and kept it on the top of the stirrer platform. Remove the cap of the sample insertion port and insert Teflon coated magnetic stirrer paddle into the reaction vessel. Insert the electrode in the reaction vessel and connect its pins at the female connector given back side of the instrument.

Fill Karl Fischer Reagent in 250ml. Amber colour bottle.

Connect one end of supplied Teflon tube with micro tip to reaction vessel and another end with amber colour reagent bottle.

Connect AC power Cord (Check the mains 230 V AC supply which should have proper Earth, voltage between Neutral and Earth should be less than 3 (three) Volts) and switch ON the instrument.

While Switch On the instrument from the mains, instrument will display as follows.

ANALAB	Manufacturer's Name
Karl Fischer Titrator	
Model µAquaCal10+	Model Number
Version 2110/05-04/01.00	Software Version number
ANALAB VADODARA Stirrer Off	Standby display

10. Operation Procedure

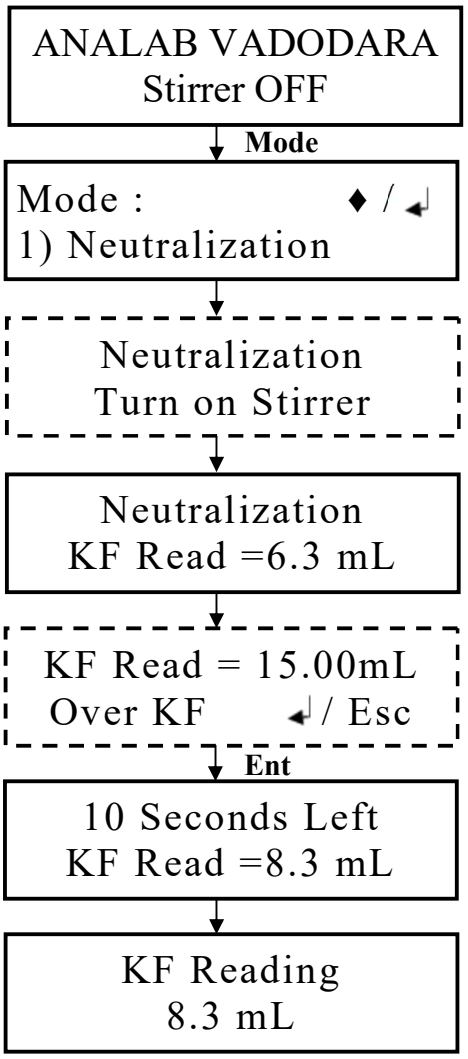
µAquaCal10+ operation is distributed in Four (4) different modes i.e. Neutralization, Calibration, Analysis, and Utilities.

10.1. Neutralization

Before performing calibration or sample analysis, always neutralize the reference solvent i.e. anhydrous methanol to remove moisture in it.

Add reference solvent i.e. anhydrous methanol in dried reaction vessel till it covers electrode tips from sample insertion. (Sample in) and start stirrer and control the stirrer speed to stir the solution fast enough without causing excessive splashing and bubble formation.

Note: Always use HPLC grade methanol to avoid excess use of reagent during neutralization



Standby screen

Press **Mode** Key and select neutralization.

.
Press Enter for Neutralize the solvent

If stirrer is “OFF” this massage will display
Turn ON stirrer with Stirrer ON/OFF key

KF reagent starts dispensing to vessel till Solvent (Methanol) completely neutralize i.e. moisture free.

If reagent dispenses 15 mL, instrument gives audio alarm and massage “Allow Over KF?”
It is advisable to remove Methanol and fill fresh Methanol to reduce consumption of reagent

If press **ENTER** dispensing starts again.

Once solvent (Methanol) is completely moisture free-reverse timer starts from 20 seconds and instrument gives audio alarm as an indication for end of neutralization.
Ignore the volume of reagent use for neutralization.

It is always recommended to neutralize reference solvent for three to four times to confirm perfect neutralization of solvent. Press **ENTER** and neutralize again as per above steps.

10.2.Calibration

For the determination of the moisture contain in sample it is important to find water equivalent factor of the Karl Fischer reagent. The equivalent factor is the capacity of reagent per ml. to absorb moisture in mg.

Calibration Interval

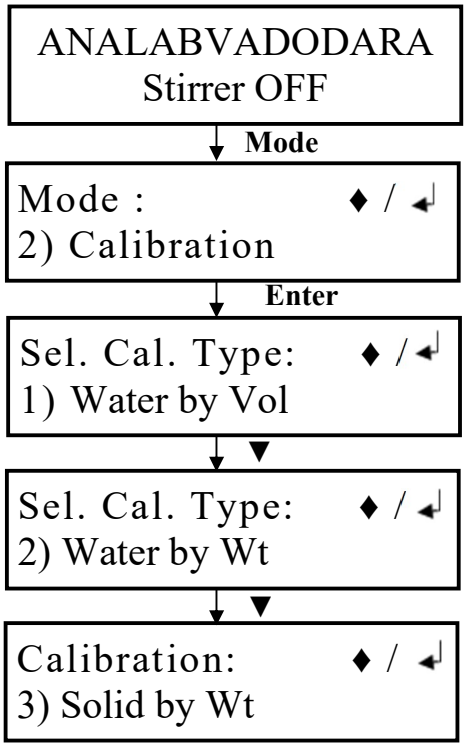
It is recommended to check the strength of Karl Fischer reagent regularly especially before doing analysis of sample, as strength will deteriorate as it is light sensitive.

Note: Before starting calibration of Karl Fischer Apparatus,

1) Always use AR grade (HPLC grade) methanol and fresh reagent.
2) Clean reaction vessel with Methanol and kept in oven at around 100 °C for at least Five minutes to make it completely dry.
3) Check all the joints on vessel, it should be leak proof. If any joint is loose, apply silicon grease to make it tight.
4) Fill methanol / solvent till electrode wire touches and start stirrer.
5) Adjust stirrer speed. Liquid should not splash on vessel wall.

Before calibrating the system, user must select Calibration type between **1) Water by Volume 2) Water by Weight or 3) Disodium Tartrate.**

Note: If moisture level in sample is expected in ppm (Parts per Million) level than is advisable to calibrate with DST and if moisture level is in % level, calibrate with water. (Water by Weight is more accurate method then water by volume)



Press **MODE and ▼** key to perform calibration.

Press **ENTER**

Press ▼ key to select calibration type between

Water by Volume

Water by weight

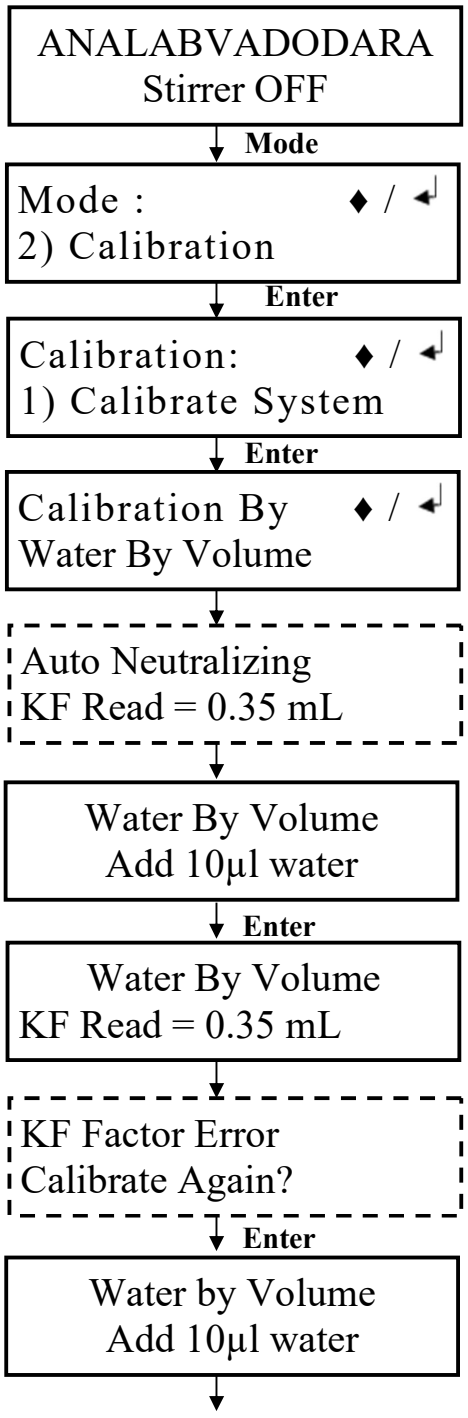
OR

Solid by weight (With DST)

10.2.1. Calibration with Water by Volume

With water by volume calibration, fix 10µL water to be inject with calibrated syringe. Instrument will calculate KF factor with following.

$$\text{Water Equivalent Factor} = \frac{\text{Water Added in µL with syringe (10µL)}}{\text{KFR used in mL (Display reading)}}$$



Press **MODE and ▼** key to perform calibration.

Press **ENTER**

Press ▼ key to select calibration type before calibrate system

Press Enter calibrate

If electrode sense moisture in vessel, auto neutralization starts. Wait till neutralization complete

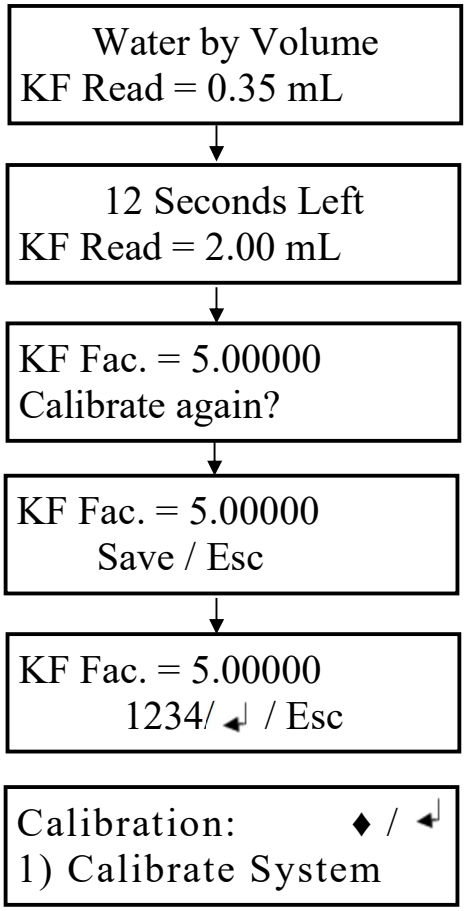
After auto neutralization, instrument will give message to add 10 µl water.
use 10 µl syringe and remove air bubble for accurate result/factor)

Add 10µl water from sample hole and Press **ENTER** (Sample addition should be as fast as possible to avoid external moisture to enter in vessel)

Reagent starts dispensing in vessel till stable end point achieved

If Factor determine below 4 and above 7, KF Factor Error message will display. Change KF reagent and calibrate again.

Again, add 10µL sample with syringe and press Start.



Reagent starts dispensing in vessel till stable end point achieved

Reverse timer starts from 20 seconds and at the end, instrument gives audio alarm indicating END point achieved

Instrument will show KF factor1.
Press ENTER to recalibrate.
(**It is advisable to calibrate three to five times and take average factor)**

Press Enter to save KF Factor

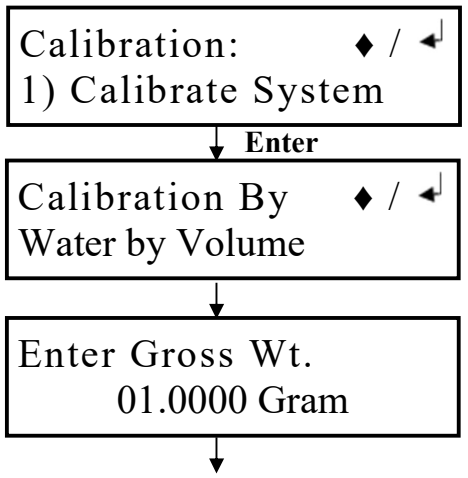
Calculate Average factor from calibration readings and enter new Average value with Numeric key and press **Enter** to save the Average Factor.

Press ESC to come out from calibration mode

10.2.2. Calibration with WATER BY WEIGHT

This calibration method is more accurate than “water by volume” as water drops must weigh with precise balance preferably with 0.1 mg accuracy. Human error can be eliminating. Instrument will calculate KF factor with following.

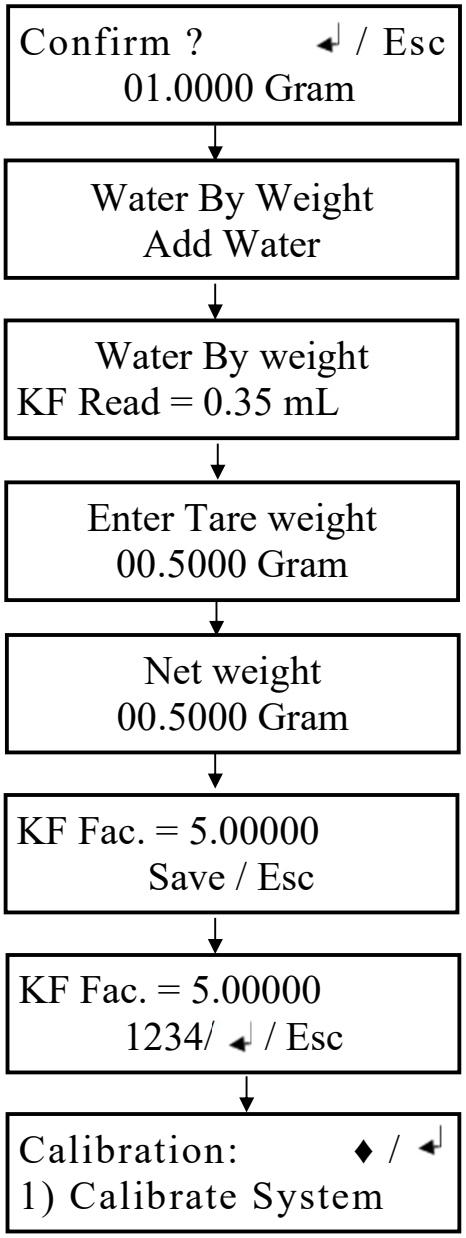
$$\textbf{Water Equivalent Factor} = \frac{\textbf{Weight of water Added in mg}}{\textbf{KFR used in ml. (Display reading)}}$$



Press ▼ key to select calibration type

Press ▼ key to select calibration type before calibrate system

Tale the weight of dropper bottle filled with water on accurate balance and enter the gross weight



Confirm entered gross weight value
Press ENTER

Add one small drop in vessel from dropper bottle and press ENTER

Reagent starts dispensing in vessel till stable end point achieved

Enter Tare weight

Instrument will display Net weight of water injected

Press Enter to save KF Factor

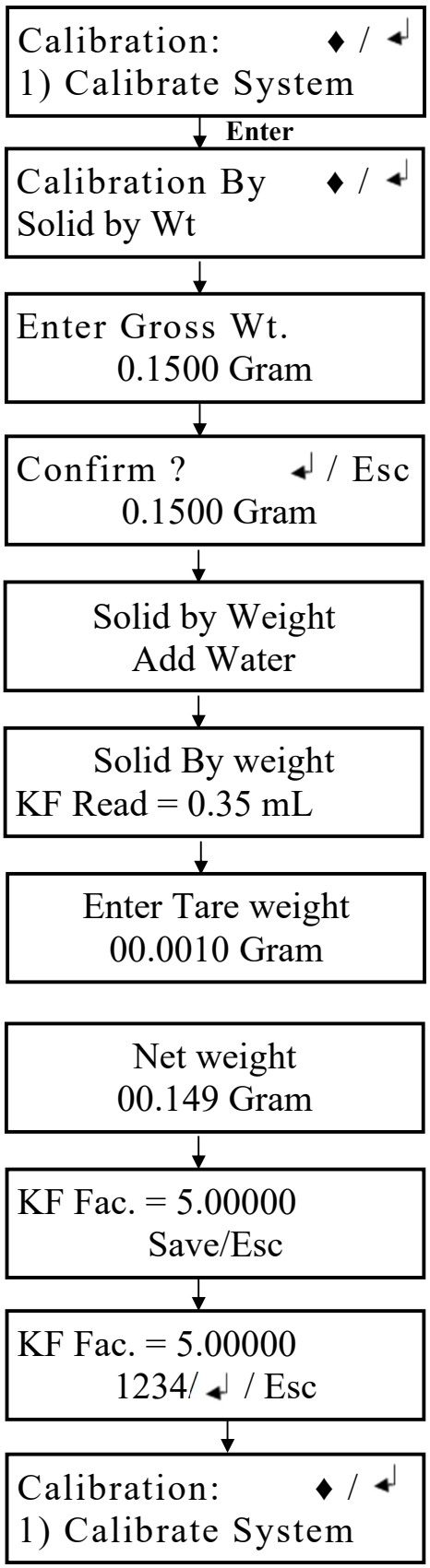
Calculate Average factor from calibration readings and enter new Average value with Numeric key and press **Enter** to save the Average Factor.

Press ESC to come out from calibration mode

10.2.3. Calibration with DISODIUM TARTRATE

Di sodium tartrate (DST) use for volumetric standard for Karl Fischer titration. Under normal conditions, It is stable and non-hydroscopie. DST has a water content of 15.66%.

$$\text{Water Equivalent Factor} = \frac{\text{Weight of DST in mg. x 0.1566}}{\text{KFR used in ML.}}$$



Press ▼ key to select calibration type

Press ▼ key to select calibration type before calibrate system

Weigh Approx. 0.1500 gm DST with balance having minimum 0.1mg accuracy. Enter gross weight.

Confirm entered gross weight value
Press ENTER

Add one small drop in vessel from dropper bottle and press ENTER

Reagent starts dispensing in vessel till stable end point achieved

Enter Tare weight

Instrument will display Net weight of water injected

Press Enter to save KF Factor

Calculate Average factor from calibration readings and enter new Average value with Numeric key and press **Enter** to save the Average Factor.

Press ESC to come out from calibration mode

NOTE:

- For practical purposes the titer value of the K.F. reagent is confined between 4 and 7 mg. of water/ml of reagent. The weaker the reagent less sharp will be the end point.

- For accuracy, it is recommended that the Titer value (Water equivalent factor) be determined daily and under the same conditions and at the same temperature as that of the subsequent determination of water content.

10.3. Analysis

Important: For accurate results, extreme care should be taken while injecting/inserting sample so that external moisture does not enter the reaction vessel. Therefore, sample insertion port should be opened for a short time possible to insert the sample.

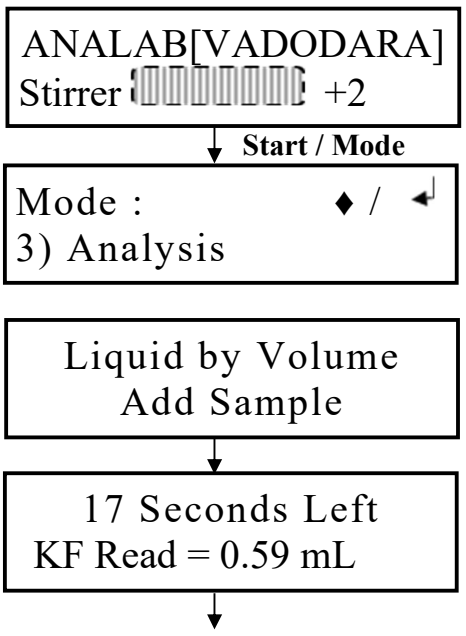
10.3.1. Analysis of Liquid sample with Volume

Before analysis, Select type of analysis i.e. Liquid by Volume from UTILITY.> Parameter1 >Sample type>1) Liquid by volume

Liquid sample can be injected with the help of mL. syringe or pipet Before use, the syringe/Pipet must be clean with the liquid sample.

Add sample after display shows" Add Sample" (The mass of sample depends on its expected water content and on the type of apparatus used.) Titrate with the Karl Fischer reagent. Calculate Moisture using following formula.

$$\% \text{ Moisture} = \frac{\text{KF Consumption in ML. x Factor (WE) x 100}}{\text{Volume of liquid in ML x Density of liquid x1000}}$$

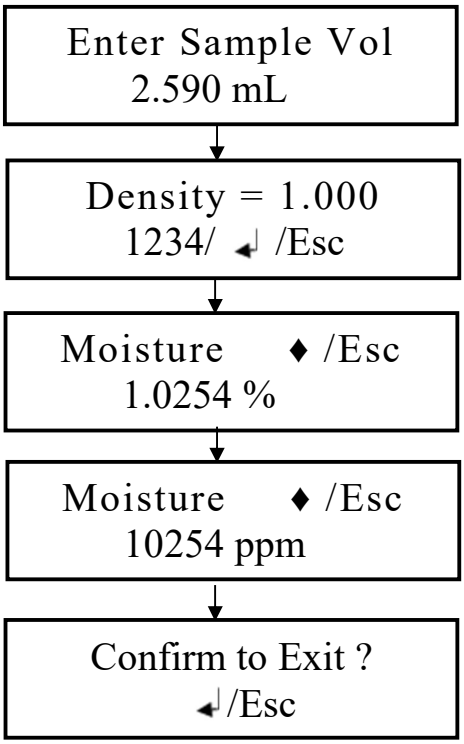


Press **START** / **MODE** key to analyse sample.

If mode key pressed, select analysis mode with ▼key.

Add liquid sample with syringe or pipet.

When liquid is moisture free, reverse timer starts from 20 seconds, and at 0 second, instrument gives audio alarm and will display reagent consumption volume in mL.



Enter Sample volume in mL

Enter Density of sample

% Moisture result will display
Press ▼ key to view ppm moisture result

ppm moisture

Press **Esc** to exit

Press **Enter** to confirm exit

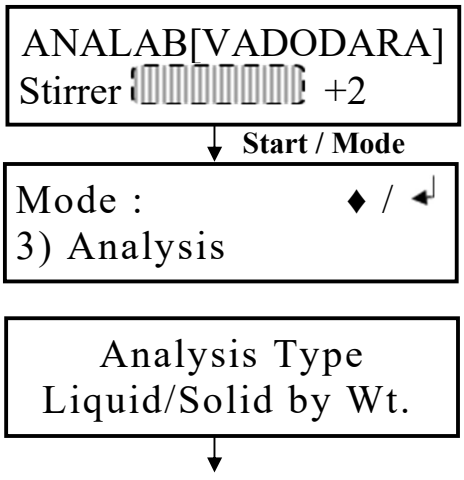
10.3.2. Analysis of Liquid or Solid sample with Weight

Before analysis, Select type of analysis i.e. Liquid by weight from UTILITY.> Parameter1 >Sample type>2) Liquid by weight or 3) Solid by Weight

For liquid or solid sample with weight, accurate analytical balance is requiring. Minimum resolution should be equal to better than 0.1 mg.

Calculate Moisture using following formula.

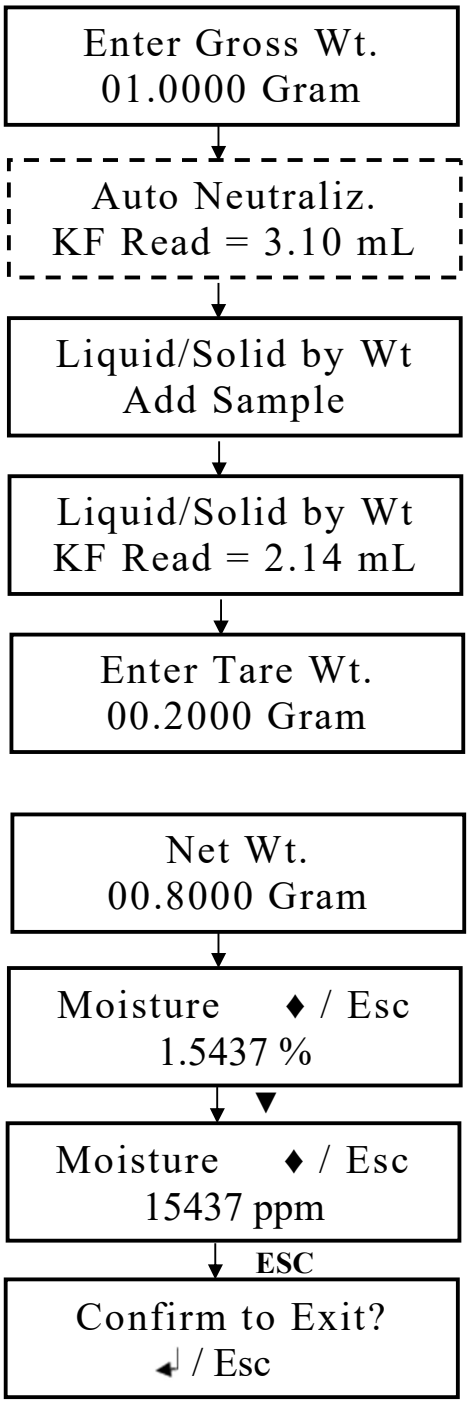
$$\text{\% Moisture} = \frac{\text{KF Consumption in ML. x Factor (WE) x 100}}{\text{Wt. of Sample in gram X 1000}}$$



Press **START** / **MODE** key to analyse sample.

If mode key pressed, select analysis mode with ▼key.

Take a weight of Liquid sample or Solid sample.



Enter and confirm weight of sample.

If sensor sense a moisture in vessel, auto neutralization will start.

After neutralization, Instrument is ready to take sample. Add Sample. (Sample addition should be as fast as possible to avoid external moisture to enter in vessel)

Reagent starts dispensing in vessel till stable end point achieved

Enter Tare weight if any. (Tare weight should be always less then Gross weight)

Instrument will calculate net weight

Instrument will show % result.

Press ▼ key

Moisture in ppm

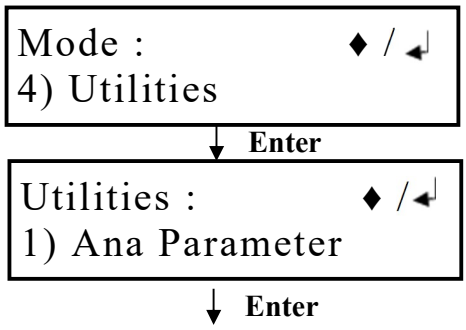
Press ESC to exit from analysis.

Confirm exit from analysis by pressing ENTER key.

10.4. Utilities

This mode is useful to set instrument parameters require to perform sample analysis. Before starting actual analysis.

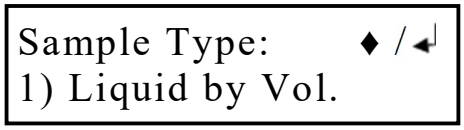
10.4.1. Utility: 01 Analysis Parameters



Press mode and scroll down to select mode 4 i.e. Utilities.

10.4.1.1. Analysis Parameter :01 Sample Type

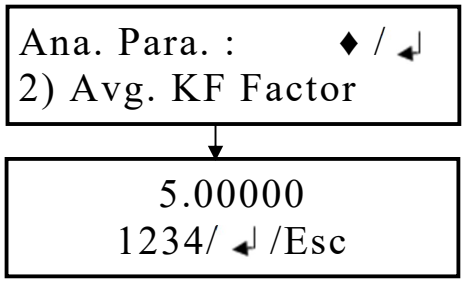
This parameter is useful to set type of sample to analyse. User can select sample type between 1) Liquid by Volume 2) Liquid by Weight and 3) Solid by Weight



Select sample type by scrolling the display with ▲ / ▼ keys and press **ENTER** to confirm selection. Press **ESC** to come out from parameter

10.4.1.2. Analysis Parameter :02 Average KF Factor

This parameter is useful to edit Average KF factor. As Average factor is to be calculate manually, User can feed or edit this value from this utility.

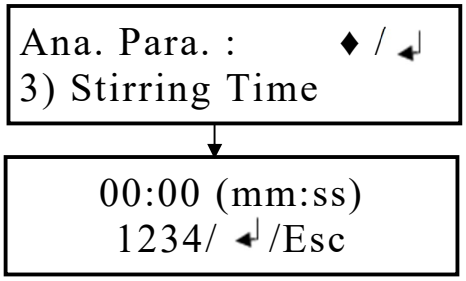


Press Enter to Edit Average KF Factor

Edit Average value with numerical keys and press Enter to confirm. New value will update

10.4.1.3. Analysis Parameter :03 Stirring Time

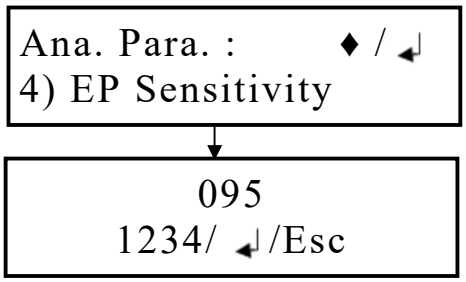
Stirring time is times require dissolving sample in reference solvent (e.g. methanol) properly before actual analysis starts.



Set stirring time between 99 min. and 59 Sec.

10.4.1.4. Analysis Parameter :04 End Point (EP) Sensitivity

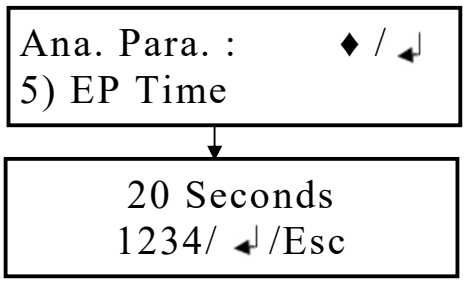
This parameter is useful to adjust sample End Point sensitivity. Default value is 095.



Set End point sensitivity between 80 to 100

10.4.1.5. Analysis Parameter :05 End Point Time

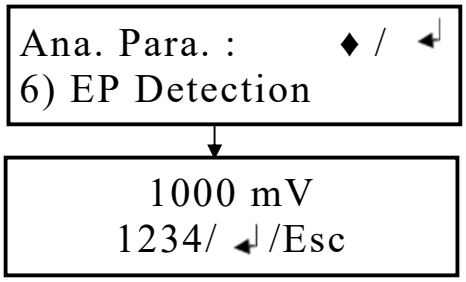
After reaching at end point, stability of end point must observe for some time, this time is known as END POINT time. During this time dispensing of reagent stops, and after completing, instrument gives audio signal as a End of the analysis. Default Value is 20 sec. User can set End Point Time as per application demands.



Set End point time between 0 and 20. Default time is 20 seconds

10.4.1.6. Analysis Parameter :06 End Point Detection

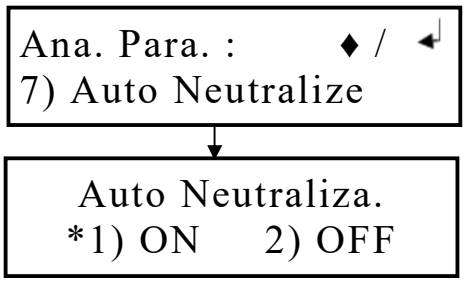
End point mV can set from this menu. Default end point is set to 1000 mV i.e. when end point mV reaches at 1000 mV, instrument will give End Point of sample. User can set different mV as per sample analysis demands.



Set End detection mV between 1000 and 3000. Default mV is 1000 mV

10.4.1.7. Analysis Parameter :07 Auto Neutralization

µAquaCal10+ has unique facility of Auto Neutralization. During new analysis, if electrode senses moisture, instrument will automatically neutralize reference solvent. This facility prevents wrong analysis result. User can set this facility ON/OFF. (it is always recommended to keep Auto neutralization ON)

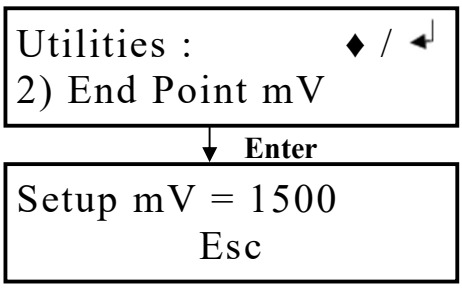


Press 1 to Select auto neutralization ON or press 2 to select auto neutralization OFF.

10.4.2. Utility: 02 End Point mV

End point mV indicate the status of end point. When liquid in reaction vessel is neutralized, end point mv will show less than settled end point value, Default end point value is 1000,

Electrode condition can also check with end point setup value. Remove electrode from vessel and check end point mV which should show above 3000. Now, short its two platinum wires, setup value should show near to zero, this confirms the status of KF electrode.



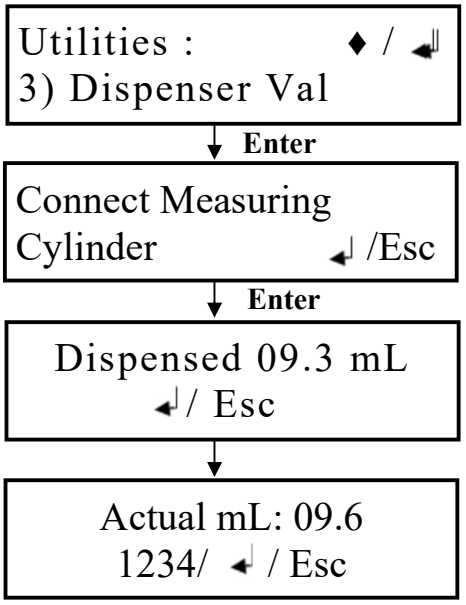
Enter in utility number 2 to observe end point status

Display shows existing mV value.

10.4.3. Utility: 03 Dispensing Validation

Accuracy in dispensing of reagent is very essential to get accurate results, hence dispenser should validate time to time with Karl Fischer Reagent. Dispenser validation should perform,

1 After replacement of Dispenser tube
2 when instrument was unused for more than 10 days.
3 After every 15 days to confirm



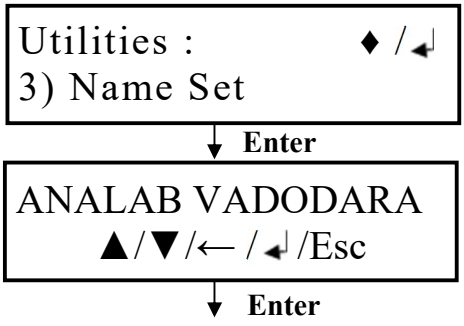
Remove Reagent Teflon tube connected with sample vessel and put it in to the 10 mL calibrated measuring cylinder and press **ENTER**

Note: Fill Teflon tube completely till micro tip with **fresh** reagent before putting it in to the measuring cylinder

Dispensing starts and reagent will collect in cylinder. Observe reading on cylinder and press **ENTER,** dispensing will stop.
Enter actual value with numerical keys.
Dispensing value will update and saved.
Repeat above procedure for two to three times to minimize error.

10.4.4. Utility: 04 Company Name Set

User can set the name of company to display on standby screen of the instrument.



Set required name on display with ▲/▼ keys.
← key use to remove wrongly applied character.
Press ENTER to update new name.

11. Error Messages

µAquaCal$_{10+}$ will give following massages in case of wrong operation of Instrument.

1 **ALLOW OVER KF?** In case of excess moisture in sample, this massage will appear. When 15.00 ml of KF reagent dispenses in vessel, instrument sense over moisture. Press Enter to continue titration or press Escape to stop.

2 **TURN ON STIRRER**: If stirrer is off when pressing **START** key, this massage will display, Press Stirrer On/Off key

3 **KF Factor Error:** If KF factor is not within range i.e. from 0.1 to 10.00 this message will display.

12. Preventive Maintenance

To run instrument smoothly for years, preventive maintenance is requiring at regular intervals.

Electrode Maintenance: Contamination on Dual platinum electrode find sometimes, which require periodic cleaning. Immersing the electrode in chromic acid cleaning solution can do cleaning. After cleaning and washing in tap water, rinse electrode twice or thrice in distilled water and then in methanol or acetone and dry it with Air.

Silicon Tube: Silicon tube in dispenser unit can be clean with methanol.

1. Replace Methanol with reagent (remove tubing from reagent bottle and insert in methanol bottle). Press Flush key, methanol start dispensing from tube. Allow methanol to run till complete reagent flush out from Teflon tube.
2. Remove inlet tube from methanol and keep outside the bottle and again flush the system let all methanol in tube to remove. With this cleaning, life of tubing will increase.
3. Drain all liquid from reaction vessel.

13. Standard Operating Procedure

- Always use AR grade (HPLC grade) methanol and fresh reagent.
- Clean reaction vessel with Methanol and kept in oven at around 100 °C for at least Five minutes to make it completely dry.
- Check all the joints on vessel, it should be leak proof. If any joint is loose, apply silicon grease to make it tight.
- Fill methanol / solvent till electrode wire touches and start stirrer.
- Adjust stirrer speed. Liquid should not splash on vessel wall.

13.1 Standardization of Instruments Using Water:

13.1.1. Fill reagent bottle fully 250 mL and add KF grade Methanol in Reaction vessel up to tip of Electrodes.
13.1.2. Start stirrer by pressing stirrer on / off key and adjust proper speed of stirrer.
13.1.3. Press Mode key and select mode 1 i.e. Neutralization and neutralize methanol.
13.1.4. Repeat above step 13.1.3 two to three times to confirm neutralization of methanol
13.1.5. Once Neutralization over, Select Mode 2 i.e. Calibration mode and select calibration type “Water By Volume”, Add water with 10µl water with syringe when “Add Water “message flash and start titration with ENTER key. KF reagent starts entering in vessel and ml display will start increasing.
13.1.6. Once End point achieved, buzzer starts.
13.1.7. Note down ml reading of KF dispensed.
13.1.8. Repeat above steps i.e. 13.1.5 to 13.1.7 three to five times. Take average of display reading and enter new average value.
13.1.9. Instrument will Calculate “WATER EQUVIVALANT FACTOR or KF strength with given formula.

Result: (Water Equivalent Factor)

$$\text{Water Equivalent factor} = \frac{\text{mg. of water added (10 µlitre = 10 mg of Water)}}{\text{Burette Reading in ml.}}$$

13.2 Determination of Moisture in unknown Sample

Di sodium Tartarated is used as an unknown sample as it has fixed percentage of water content (15.67% ± 1% or as per mention by manufacturer). It does not decompose and is not hygroscopic.

13.2.1. Select sample type “Solid by Weight” from MODE>UTILITIES>ANA.PARAMETERS>SAMPLE TYPE
13.2.2. Weigh 0.150 Gram (fine powdered) DST by accurate balance and insert in vessel.
13.2.3. Dilute it properly in methanol with stirring for approx. 1 to 2 minutes
13.2.4. Press Start key and enter Gross weight of DST
13.2.5. Add sample where “Add Sample” message display.
13.2.6. KF Reagent will start adding in vessel.
13.2.7. After getting END point, buzzer starts, and display will show ml. reading of KF reagent use for getting neutralize the sample.
13.2.8. Enter Tare weight, Instrument will calculate Net weight of DST and will display moisture reading in % and PPM on scrolling.

Result: (Using 150 mg. Di-Sodium Tartrate)

$$\% \text{ Moisture in Sample} = \frac{\text{Reagent consumed in ml x AV. Factor}}{\text{Wt. of Sample in gram x 1000}} \times 100$$

Note: Perform above step to find out % Moisture from any unknown sample. Take approx. sample in gram or ml so that, approx. more than one ml of KF consume to get proper result.

14. Guarantee

All Analab make instruments are guaranteed for a period of 12 calendar months from the date of installation or 18 calendar months (whichever is earlier) from the date of delivery against defects in material or workmanship other than valves, semiconductor, electrodes, batteries, PVC & Polycarbonate material etc. During the guarantee period, our liability is limited to the repair or replacement at our option of the instrument or parts thereof found to be defective.

15. Service After Sales

Utmost care is taken in the design, manufacture, and inspection of all ANALAB makes instruments to ensure trouble free service for long period. However, in case of unsatisfactory performance of any our instruments please contact our distributor for your area through whom the instrument was purchased under intimation to us.

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