MKC-520 / MKC-501

Option:Printer IDP-100

Karl Fischer Moisture Titrator MKC-520 and MKC-501

The Karl Fischer Moisture Titrator MKC-520 and MKC-501 are the result of KEM's many years of experience. The MKC-520 and MKC-501 which combines the latest technology and advanced engineering with KEM's vast experience in instrumentation, are fine coulometric Karl Fischer titrator available today.
The MKC-520 and MKC-501 are widely used for Karl Fischer titration throughout the world. Karl Fischer titration is the most reliable method for the determination of moisture content. It is used for quantitative analysis by titration for moisture in solids, liquids and gases.
The MKC-520 and MKC-501 as a microprocessor controlled coulometric titrator are one of the best instruments to accurately measure very low levels of moisture in samples in a short span of time.
For measurement of solid sample or samples which cannot directly be put into the reagent, the moisture evaporator ADP-511S works for it. The ADP-511S is easy to operate and maintains steady conditions while vaporizing moisture contained in a sample. The settings of sample boat maneuver, vaporizing temperature and carrier gas running duration, and other conditions for each method are controllable by storing them in memory of the MKC-520.

Features

Easy to operate

Very simple operation just pressing [start] key.

Variety of standard interface

Interface for Computer, Balance and Printer is standard equipment

Displays measurement results with high repeatability

Guarantees below 0.3% of Relative Standard Deviation (RSD) in the measurement on 1mg H_2O water-methanol standard.

Dispenser for Karl Fischer reagent (MKC-520)

The reagent dispenser as standard equipment eliminates troublesome replacements.

One-component cell can be used. (MKC-520-N and MKC-501-N)

One-component cell allows for easy maintenance in replacing reagents and lower running cost.

Titration cell can be increased to 2 units. (MKC-520)

Once the optional stirrer and titration cell are added, two cells can be used alternatively.

Principle of Analysis

In the karl Fischer reaction, water in the sample reacts with iodine and sulfur dioxide quantitatively in the presence of base and alcohol:

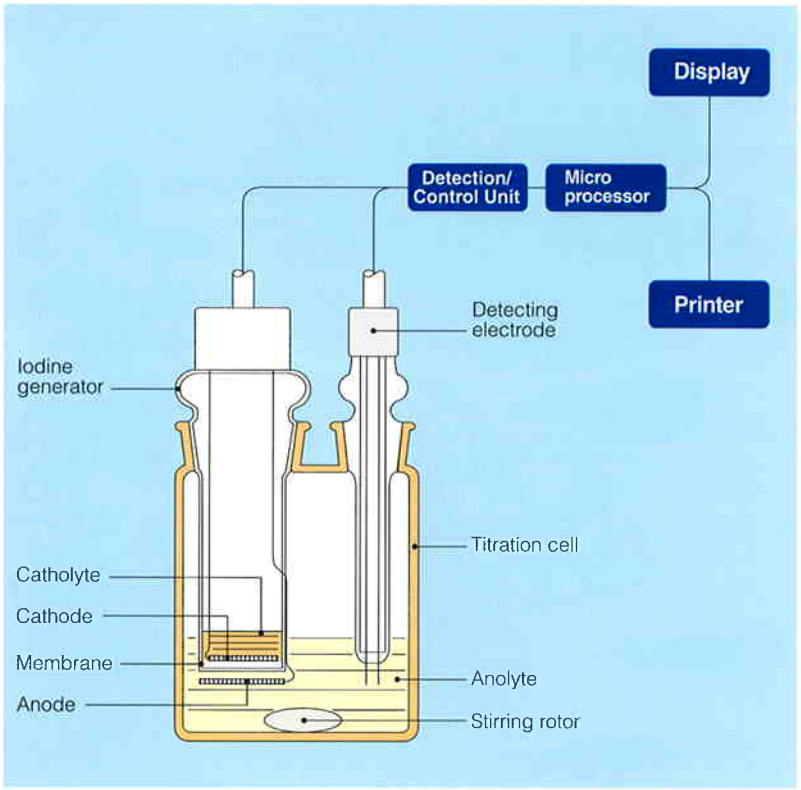
$$I_2+SO_2+3Base+RHO+H_2O \rightarrow 2Base \cdot HI+Base \cdot HSO_4R$$

Base: amine, pyridine, etc
RHO (solvent) : 2-methoxyethanol, methanol, etc.

As soon as the detector of Titrator senses decline of iodine level, it starts electrolysis to generate iodine in the anolyte to restore its equilibrium.

$$2I^- \rightarrow I_2+2e^-$$

The amount of water in the sample is then calculated based on the current consumed for this electrolysis.



Applications

The Karl Fischer Moisture Titrator Model MKC-520 and MKC-501 can make moisture analysis for a variety of natural products, raw materials and industrial products.

Organic compounds and raw materials:

Organic acid / Alcohol / Ester / Acetar / Ether / Hydrocarbon / Acid anhydride / Acyl chloride / Acid chloride / Nitrogen compound / Halogen compound / Sulphur compound / Peroxide / Carbonyl compound / Hydrate organic salt / Organic acid, etc.

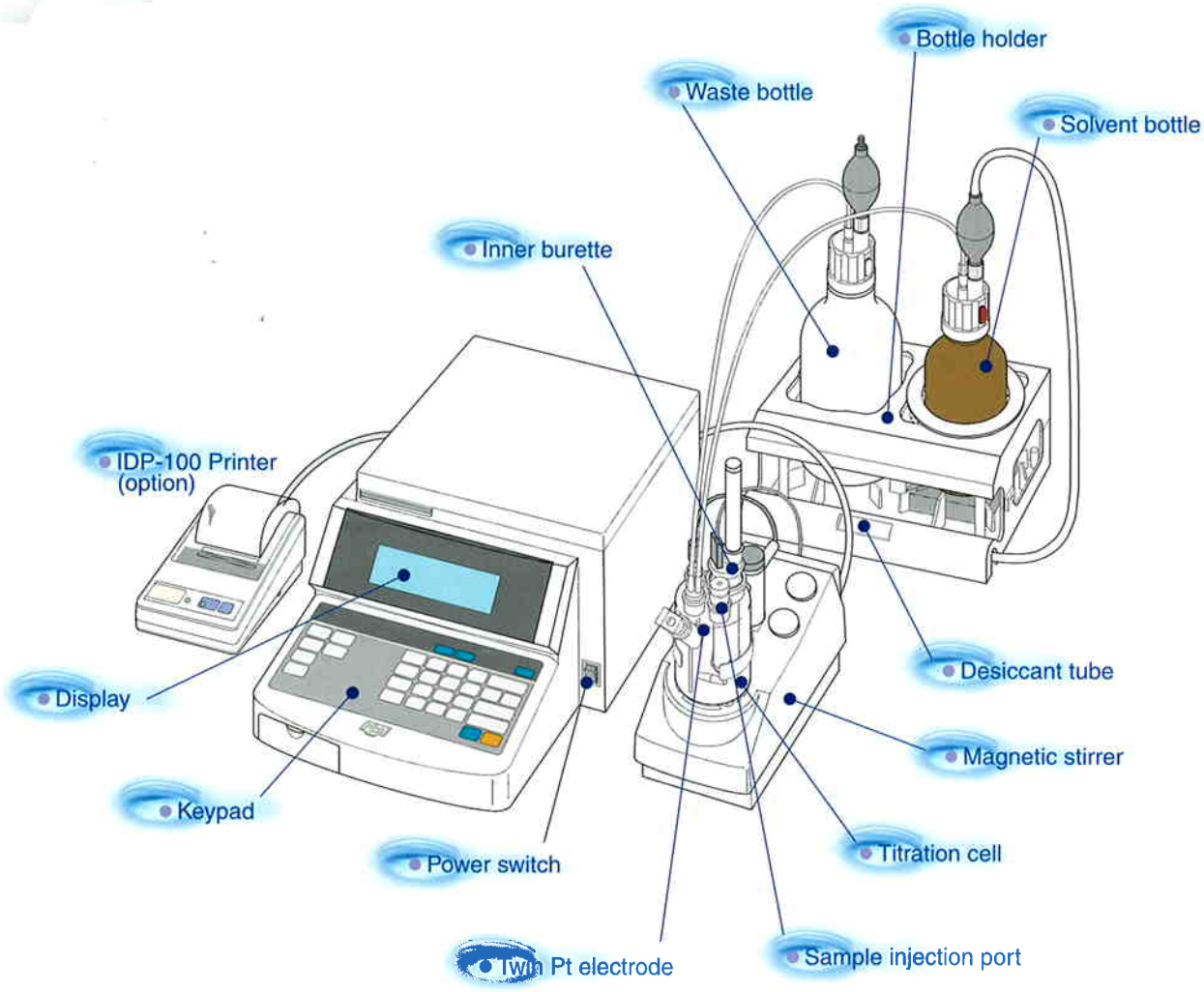
Inorganic compounds and raw materials:

Hydrate inorganic salt / Inorganic salt / Acid anhydride / Base anhydride / Inorganic acid / Peroxide, etc.

Natural products and industrial products:

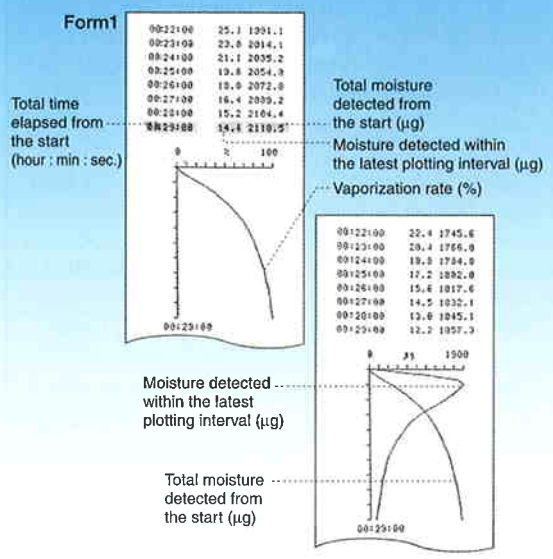
Medicines / Body tissues / Alkaloid / Capsules / Fertilizer / Agricultural chemicals / Wood / Pulp fibers / Wools / Texitiles / Leathers / Cellophane tapes / Synthetic detergents / Soaps / Cosmetics Milk / Butter / Cheese / Oils / Fats / Fatty acid / Dehydrated foods / Grains / Starches / Sugars / Caramels / Chocolates / Teas / Coffees / Citric powders / Spices / Seasonings / Alginic acid / Gelatin / Fish meals / Coal / Coal tars / Heavy oils / Petrol / Kerosene / Transformer oils / Lubricants / Greases / Silicon oils / Flux / Benzine / Gas / Liquified petroleum gases / Freon gases / Viny-lchloride monomer / Plastic powder / Plastics chips / Ion-exchange resin / Rubbers / Adhesive pigments / Paints / Inks / Dyes / Carbon blacks / Toners / Liquid crystal materials / Photo materials / Ferrites / Metal powders / Explosives / Desiccants / Ores / Clays / Cements / Sulpher, etc.

【MKC-520】

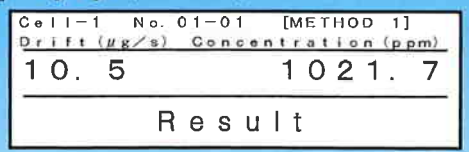


Graphic printout (MKC-520)

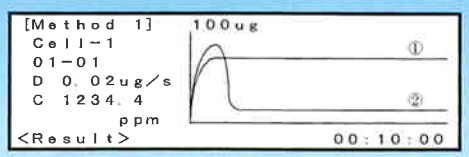
Moisture detected within the latest plotting interval and total moisture from the start to the end is output for printing.



Displays (MKC-520)

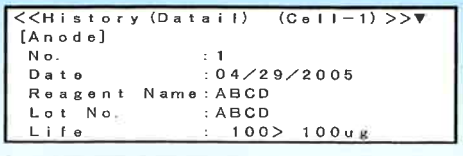


Display of measurement result

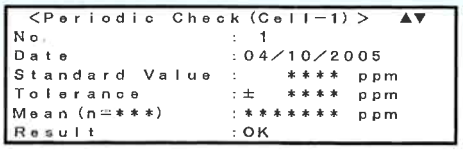


Display of vaporization curve (after measurement)

vaporization curve:
① Accumulated moisture content/ measuring time
② Accumulated moisture content per unit time /measuring time



Records of KF reagent



Records of precision check

MKC-520-D
(Diaphragm cell)

MKC-520-N
(Diaphragmless cell)

MKC-501-D
(Diaphragm cell)

MKC-501-N
(Diaphragmless cell)

Method which measures moisture by weighing liquid or solid sample

$$\frac{(\text{Data} - \text{DriftXt} - \text{Blank})}{\text{Wt1} - \text{Wt2}} \times 1000(\text{ppm})$$

```
Model :MKC-520
S/N   :MAB60A91
Sample:
  --------------------
Reagent:
  --------------------
Name:
  ----------------

*** R e s u l t ***

Sample No.    01-01

Date 05/02/14 15:53
Wt1         9.1893 g
Wt2         7.3356 g
Net         1.8537 g
Result       357.1 ug
            192.64 ppm
```

Method which measures moisture by measuring the volume of liquid sample

$$\frac{(\text{Data} - \text{DriftXt} - \text{Blank})}{\text{V1} \times \text{Dens}} \times 1000(\text{ppm})$$

```
Model :MKC-520
S/N   :MAB60A91
Sample:
  --------------------
Reagent:
  --------------------
Name:
  ----------------

*** R e s u l t ***

Sample No.    01-01

Date 05/02/14 13:37
V1            0.2 mL
Dens       0.9865 g/mL
Result      153.1 ug
            775.98 ppm
```

Measurement of gaseous sample

$$\frac{(\text{Data} - \text{DriftXt} - \text{Blank}) \times 22.4}{\text{V2} \times 18} \times \left(1 + \frac{T}{273}\right) \times 1000(\text{ppm})$$

```
Model :MKC-520
S/N   :MAB60A91
Sample:
  --------------------
Reagent:
  --------------------
Name:
  ----------------

*** R e s u l t ***

Sample No.    01-01

Date 05/02/14 13:34
V2          100.4 l
Temp.        22.5 °C
Result      165.0 ug
            717.24 ppm
```

Statistics calculation

Unit: Number of samples
SD: Standard deviation
Means: Mean value
RSD: Relative Standard Deviation

```
[Result]
 No. ugH2O Conc[ppm]
 01  469.6   253.33
 02  471.8   254.52
 03  473.6   255.49
 04  471.0   254.09
 05  474.6   256.03

<Auto Statistics>

Date 05/02/14 13:55
Sample No.(High) 01
Method          1

Results         5
Mean       254.69 ppm
SD         1.0809 ppm
RSD        0.4244 %


Name:
  ----------------
```

Specification

Type and Model	MKC-520	MKC-501
Measuring method	Karl Fischer coulometric titration method	
Measuring range	10μg to 100mg H_2O	
Display resolution	0.1μg H_2O	
Repeatability	within 0.3%RSD (n=10)/water-methanol 1mg H_2O	
Control method	Constant current pulse time control	
Endpoint detection	AC polarization	
Display	Pre-titr (Excessive moisture state) Ready (Measurable state) Stable (Stabile drift state)	
Indication of endpoint	Electronic beep	
Stirring method	Magnetic Stirrer Stirring speed adjustable by 10 steps	
Titration Cell	100mL (Max. 150mL) 2 channel (option)	100mL (150mL Max)
Drift compensation	Automatic (cancelable with key entry)	

Type and Model	MKC-520	MKC-501
Moisture quantity display	H_2O 0.1μg to 999999μg (display at end of titration) Br_2 0.9μg to 999999μg	H_2O 0.1μg to 999999μg
Diagnostic function	Electrolysis current, Measurement value, Overtitration, Reagent life (anolyte/catholyte), Electrode contact (short/open), Parameter error, Preamplifier error, Inhibited Key entry	
External control	Printer : IDP-100 prints Date and time, Sample ID, Sample weight, H_2O content, etc. Balance : Automatic weight reading Computer : RS-232C Interface	
Ambient condition	Temperature : 5 to 35°C Humidity : below 85%RH	
Power source	AC100 / 120 / 220 / 230 / 240V, 50/60Hz	
Power consumption	Approx. 50W	
Dimension	1) Main unit 288(W)×468(D)×215(H)mm 2) Stirrer 118(W)×225(D)×330(H)mm 3) Solvent change unit 240(W)×170(D)×405(H)mm	Main unit 288(W)×468(D)×475(H)mm
Weight	Approx. 10kg	Approx. 7.5kg
CE marking	EMC : EN61326 LVD : EN61010-1 conformance	

Standard components

	MKC-520-D	MKC-520-N	MKC-501-D	MKC-501-N
Main unit	1	1	1	1
Magnetic stirrer	1	1	-	-
Titration cell unit (with 2 component cell)	1	-	1	-
Titration cell unit (with 1 component cell)	-	1	-	1
Washing bottle	1	1	1	1
Funnel	1	1	1	1
Septum	10	10	10	10
Anode adjuster	1	1	1	1
Twin platinum electrode / KF	1	1	1	1
KF grease (5g)	1	1	1	1
Power cord	1	1	1	1
Stirrer rotor (35mm)	1	1	1	1
Operation manual	1	1	1	1