

MKS-520 / MKA-520 / MKS-500



Option: Printer IDP-100

Karl Fischer Moisture Titrator **MKS-520 and MKA-520**

The Karl Fischer Moisture Titrator MKS-520 and MKA-520 are the results of KEM's many years of experience, which combines the latest technology and advanced engineering with KEM's vast experience in instrumentation, producing finest volumetric Karl Fischer titrator available today.

Karl Fischer titration is the most reliable method for determination of water content. It can perform for quantitative analysis for moisture in solids, liquids and liquified gases. Many of the international standards, such as ISO, ASTM, DIN, BS, JIS, etc., have adopted the Karl Fischer method for moisture determination.

The measurement results can be calculated into concentration and necessary data is printed out on the external printer.

For measurement of solid or samples which cannot directly be put into the solvent, 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 the memory of MKS-520 and MKA-520.

Features

Large LCD screen

Large LCD screen shows easy-to-operate dialog messages as well as easy-to-read measurement results including water content and concentration.

Easy operation

You can go on routine measurement simply by pressing [Pre-Titr] key and [Start] key.

Digital display of the results with high repeatability

It can measure with the repeatability of $\pm 0.01\text{mL}$ for 10mL buret.

Self-diagnostics

The built-in self diagnostic message helps you locate errors or troubles in operation and find the solution.

Dispenser for Karl Fischer reagent is standard equipment.

The reagent dispenser as standard equipment eliminates troublesome replacements. The open air does not go into a titration flask at the time of reagent exchange. Therefore, the stability after reagent replacement is quick to attain.

Automatic control of moisture evaporator

On-line control of the ADP-511S Evaporator allows solid samples to be analyzed using the same parameters and conditions. The vaporizing temperature, carrier gas running duration, etc. can be stored in memory of MKS-520 and MKA-520 for automatic control.

Standard built-in interfaces

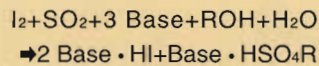
The interfaces for personal computer via RS-232C, for Balance and for Printer are now standard and each is built-in.

Dual-mode titration

MKA-520 is equipped with dual 10mL direct drive burette as standard. Each burette can work for normal and back titration. Titration using two Karl Fischer reagents with different factors is possible as well.

Principle of Analysis

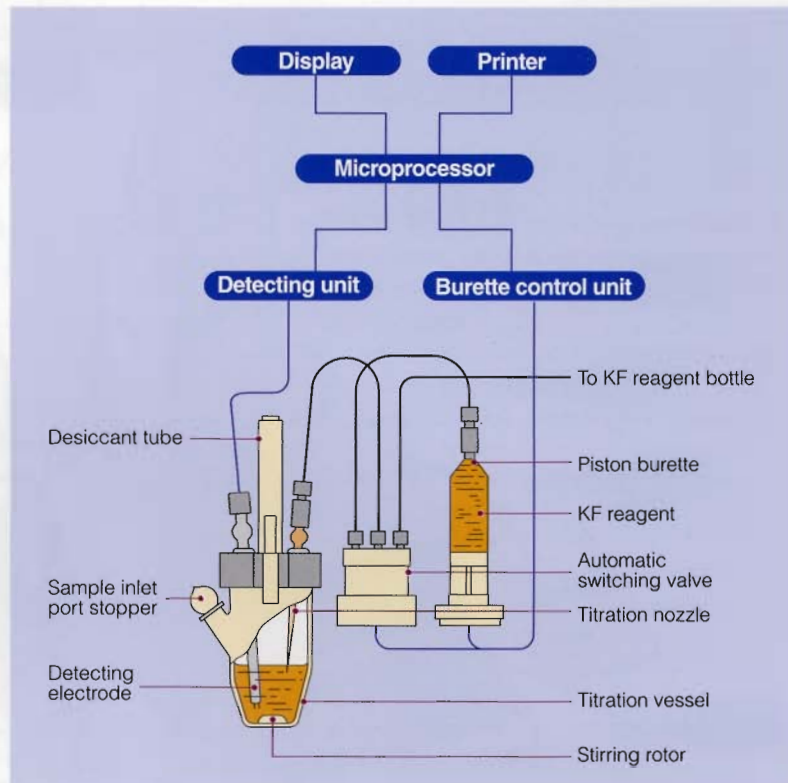
In the Karl Fischer reaction, moisture in sample reacts with Karl Fischer reagent quantitatively. MKS-520, MKA-520 and MKS-500 can make the analysis based on the following formula:



Base: amine, pyridine, etc.

ROH (solvent) : 2-methoxyethanol, methanol, etc.

Add extracting solvent to the titration cell. Titrate moisture in the solvent with Karl Fischer reagent until solvent equilibrium is reached. Add a fixed amount of sample. Titrate with Karl Fischer reagent having a known factor (mg H₂O/mL) until the endpoint is found. The Karl Fischer reagent factor can be determined using water standard or methanol standard. Then the moisture concentration of the unknown sample can be calculated.



Applications

The Karl Fischer Moisture Titrators - MKS-520, MKA-520 and MKS-500 can be used for moisture analysis with a variety of natural products, raw materials and industrial products.

Organic compounds and raw materials :

Organic acid / Alcohol / Ester / Acetal / 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 / Inorganic peroxide, etc.

Natural products and industrial products :

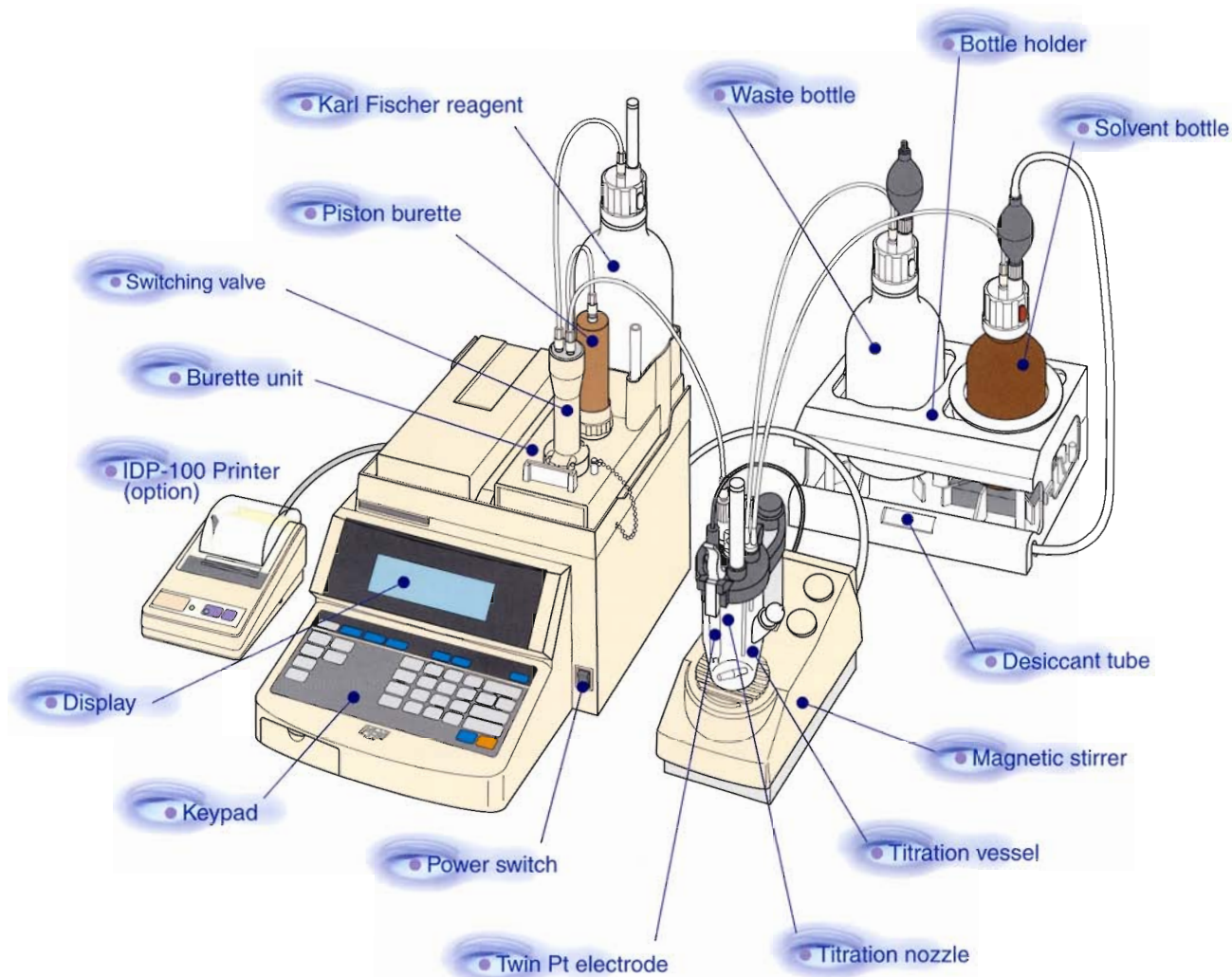
Medicines / Body tissues / Alkaloid / Capsules / Fertilizer / Agricultural chemicals / Wood / Pulp fibers / Wools / Textiles / Leathers / Cellophane tapes / Synthetic detergents / Soaps / Cosmetics milk / Butter / Cheese / Oils / Fats / Fatty acid / Dehydrated foods / Starches / Grains / Sugars / Caramels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

The ASTM standards below have adopted the Karl Fischer method for moisture determination:

Standard No.	Title	KEM Model
ASTM D 1533-96	Standard Test Method for Water in Insulating Liquids (Karl Fischer Reaction Method)	MKA-520/MKS-520/MKS-500
ASTM D 1744-92	Standard Test Method for Water in Liquid Petroleum Products by Karl Fischer Reagent	MKA-520/MKS-520/MKS-500
ASTM D 3277-95	Standard Test Method for Moisture Content of Oil-Impregnated Cellulosic Insulation	MKA-520/MKS-520/MKS-500
ASTM D 4377-93a	Standard Test Method for Water in Crude Oils by Potentiometric Karl Fischer Titration	MKA-520/MKS-520/MKS-500
ASTM E 203-96	Standard Test Method for Water Using Karl Fischer Reagent	MKA-520/MKS-520/MKS-500

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[MKS-520]



■ Titration parameter setup

TITR. PARA

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Method      1
Titr.Mode  1
End Time   30 sec
F.Vol      0.01 ml
T.Speed    Med
Detect.Mode 1
D.Time     0 sec
L.Time     0 sec
I.Time     0 sec
Blank      on
Start      manu
Max.Vol    40 ml
Oven       off
    
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■ Measurement

```

Model :MKS-520
S/N   :MGB06C56
Sample:
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Reagent:
-----
Name:
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*** R e s u l t ***
Sample No.   01-01
Date 05/02/14 14:18
Wt1      5.6874 g
Wt2      4.7082 g
Net       0.9792 g
Result    0.6418 %
Bur. No.1 3.145 mL
          6.2843 mg
    
```

■ Automatic statistics

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<RESULT>
No. mgH2O Conc[ mg]
01 10.090 10.090
02 10.086 10.086
03 10.091 10.091
04 10.078 10.078
05 10.082 10.082
06 10.083 10.083
07 10.092 10.092
08 10.102 10.102
09 10.080 10.080
10 10.081 10.081
    
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Statistics

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Unit      10
Means    10.086 mg
SD       0.0073 mg
CV       0.0724 %
    
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Specification

Type name	MKS-520	MKA-520			
Model name	Karl Fischer Moisture Titrator		Automatic Piston burette	1) Burette cylinder with piston12
Measurement method	Volumetric titration method			2) Automatic switching valve for suction/dose12
Measuring range	1) Titration volume : 0.005 to 99.995mL 2) 0.1mg to 500mg H ₂ O 3) 10ppm to 100% H ₂ O			3) Backlash mechanism and its time setting function 4) Delivery speed : maximum approximately 0.5mL/second 5) Suction speed : approximately 20s/10mL or 80s/10mL two steps 6) Capacity : 10mL, cumulative titration possible up to preset maximum titrant volume. 7) Accuracy : ±0.015mL, Repeatability : ±0.005mL	
Control method	Built-in microcomputer				
Endpoint detection	Polarized potential by Pt. 2-pin electrode with liquid resistance compensation		Solvent	1) Minimum 30mL (for S-type vessel) 2) Maximum 100mL (for S-type vessel)	
Endpoint wait time	1) Select 1 to 99 seconds 2) Set up potential to maintain EP level		Additional function	Control ADP-511S Evaporator including heating temperature, aging sequence and measuring conditions with sample boat.	
Titration form	Normal titration	1) Normal titration 2) Back titration			
Special functions	1) Titration speed control by 6 steps 2) Automatic start by sensing sample 3) Drift titration to maintain dehydration 4) Start delay setting : 0 to 9999 s 5) Continuous titration : 0 to 9999 s 6) Limit titration time : 0 to 9999 s 7) Cut-off titration : 0 to 9999 s		External control	RS-232C 1) for Printer 2) for Electronic balance 3) for Computer	
			Ambient condition	Temperature : 5 to 35°C Humidity : less than 85%RH	
			Power source	AC100 to 120V/200 to 240V, 50/60Hz	
Display	1) 240X64 dots, 30 digitsX7lines LCD with backlight 2) Displays: (1) Measured water content (2) Processed data (3) Dialog messages: Pre-titration : "Pre-titr" Standby for measurement : "Ready" Stabilized drift : "stable"		Power consumption	Approx. 35W	
			Dimension	1) Main unit 290(W)X460(D)X629(H)mm 2) Stirrer 118(W)X225(D)X320(H)mm 3) Solvent change unit 240(W)X170(D)X405(H)mm	
			Weight	Approx. 12.5kg	Approx. 13.5kg
Individual method file	Parameters for normal titration, evaporation by ADP-511S, manual factor measurement by standard, etc. can be stored in five different methods.		Standard components and parts	(1) MKS-520 Main unit1	(1) MKA-520 Main unit1
Indication of endpoint	Beep sound and message on display			(2) Operation manual1	(2) Operation manual1
Printer	Optional (Recommended printer : IDP-100)			(3) Power cord1	(3) Power cord1
Calculation	1) Batch calculation for statistics including concentration, average, standard deviation, etc. 2) Factor computation			(4) Stirrer rotor1	(4) Stirrer rotor1
Self diagnosis	Error message on erroneous key entry, excess of titration, abnormal polar potential, liquid resistance, etc.		Standard accessories	(5) Stirrer unit1	(5) Stirrer unit1
				(6) Stirrer cable1	(6) Stirrer cable1
				(7) Tube connector KF1	(7) Tube connector KF2
				(8) Anti-diffusion nozzle ...1	(8) Anti-diffusion nozzle ...2
				(1) Grease.....1	
				(2) Wrench (8mm)1	
				(3) Piston extraction rod1	