

	<b>KF Application Note</b>	No.KVX-120328
Factor	Factor Determination on Karl Fischer Reagents (with Pure water)	Volumetric titration

## 1. Abstract

Moisture determination by Karl Fischer (KF) method has been most popularly practiced in the world because it is recognized as the most reliable method for the measurement of water. The KF method is adopted by plenty of international institutions including not only ISO, ASTM, DIN, and BS but also JIS, JAS and Japan Pharmacopoeia.

In KF measurement, it is necessary to determine the factor (or titer) of KF reagents using standard substances before actual measurements. The example in this application note shows the factor determination with pure water.

## 2. References

- 1) JIS K 0113 : 2005 General rules for methods of potentiometric, amperometric, coulometric, and Karl Fischer titrations.
- 2) JIS K 0068 : 2001 Test methods for water content of chemical products.
- 3) ISO 760 : 1978 Determination of water -- Karl Fischer method (General method).
- 4) ASTM E203 - 08 Standard Test Method for Water Using Volumetric Karl Fischer.

## 3. Cautions on measurement

- 1) Use the same base solvent as is used in the sample measurements.
- 2) Use of commercial dehydrating reagents as solvents will lead to shorter measuring time and better repeatability.
- 3) Use KF reagents and dehydrating agents of the same manufacturer.
- 4) Take ca.10 $\mu$ L of pure water using a precision micro syringe with a guide.
- 5) Should use an electronic balance with 0.1mg of minimum readability when weighing pure water.

## 4. Equipment

Volumetric Karl Fischer Moisture Titrator  
MKA-610, MKA-520, MKS-520, MKS-500

## 5. Reagents

Titrant : HYDRANAL-Composite 5 One-Component

Solvent : HYDRANAL-Methanol Dry

## 6. Analysis procedure

### Preparation:

- 1) Fill the titration vessel with 30mL of Methanol Dry.
- 2) Carry out pre-titration for dehydration in the titration vessel.

### Measurement:

- 1) Take ca.10 $\mu$ L of pure water into a thoroughly dried micro syringe.
- 2) Weigh this syringe by an electronic balance with the readability of 0.1mg or less.
- 3) Inject ca.10 $\mu$ L of pure water into the titration vessel with the syringe.
- 4) Press [Start] key of the KF titrator.
- 5) Weigh the syringe after the step 3) above by the balance.
- 6) Enter the weights obtained from the above 2) and 5) steps in "Wt1" and "Wt2" entries on the KF titrator, respectively.
- 7) Repeat the above steps, 1) through 6), three to five times.
- 8) Calculate the average of water content using statistical feature or the Titrator.
- 9) After the above repeated measurements, determine the average of factor of the KF reagent by the automatic statistical calculation of the Titrator. The above value is automatically stored as the factor of the KF reagent in the memory of the Titrator.

## 7. Titration parameter setting

MKA-520 MKS-520		MKS-500	
Method	5	Method	Factor
Titr Mode	Normal	Titr Speed	3
Titr Buret No.	1	End Time	30s
End Time	30s	Final Vol,	0.01 ml
Final Vol,	0.01 ml	Detector Mode	1
Titr Speed	3	t(stir)	0s
Detector Mode	1	t(max)	0s
t(stir)	0s	Drift Titr	On
t(wait)	0s	Max. Volume	10ml
t(max)	0s		
Drift Titr	On		
Start	Manual		
Max. Volume	10ml		
Dose mode	off		
Oven	off		

## 8. Calculation parameter setting

MKA-520	MKS-520	MKS-500
Calc.	7	g → mg/ml
Unit	mg/ml	
Weight	Variable	

## 9. Sample parameter setting

MKA-520	MKS-520	MKS-500
ID	0(arbitrary)	Operator (arbitrary)
Operator	(arbitrary)	Sample. No. 01-01 (arbitrary)
Sample. No.	01-01(arbitrary)	S.name (arbitrary)
Lot No.	(arbitrary)	Sample. ID (arbitrary)
C1	100%	Weight1 Weight of meas. Item 2
Wt1	Weight of meas. Item 2	Weight2 Weight of meas. Item 5
Wt2	Weight of meas. Item 5	Cone.% 100

## 10. Measurement examples

-Ambient condition-

Room temperature: 25.0°C	Humidity: 57%	Weather: Cloudy
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-Results-

Run	Size Wt1 - Wt2(g)	Vol. (mL)	Factor (mg/mL)	Statistics	
1	0.01	1.945	5.1414	Mean	5.1591 mg/mL
2	0.01	1.935	5.1680	SD	0.0154 mg/mL
3	0.01	1.935	5.1680	RSD	0.2977 %