KEM **Application Note** №KVX-01201

Organic Chemical

Water Content of Hydrocarbons

Volumetric titration (Direct Method)by
Karl Fischer Moisture Titrator

Standard	JIS	K 0113
	ASTM	E 203
	ISO	760

1.Abstract

Moisture titration using Karl Fischer reagent is popularly practiced water determination worldwide as the most reliable method. The procedure is adopted in many official standards as test method specified in ISO, ASTM, DIN, BS and JIS.

The test conducted this time is an example of volumetric moisture titration of Hydrocarbons according to below quoted JIS K 0113-2005.

Most of hydrocarbons are soluble in methanol and easy to measure water content, however, some are difficult to dissolve where we use MI (for general purpose) extracting medium which contains 2-propanol.

The test method can measure the following chemical products:

n-Heptane, Cychlohexane, n-Hexane, Benzene, Ethylbenzene, Isooctane, Toluene, n-Pentane, Styrenemonomer, Petroleum ether, Decahydronaphthalene, Tetralin, n-Hexane, Xylene, o-Xylene. m-Xylene. p-Xylene, Methylcychlohexane, n-Octane

2. Reference

1) JIS K 0113-2005 JIS K 0113-2005: Standard Test Method by Potentiometric, Amperometrtic, Coulometric and Karl Fischer Titration
2) ASTM E 203-16 Standard Test Method for Water Using Volumetric Karl Fischer Titration
3) ISO 760:1978 Determination of Water-Karl Fischer method (General method)
4) Hydranal manual published by Riedel de Haen

3. Cautions in measurement

1) In order to refrain from the effect of ambient humidity, the test must be conducted in a well air-conditioned room.
2) Handle with care when you work on test sample.
3) Use a syringe to inject test sample. Therefore, change the side stopper of measuring flask accordingly.
4) Since Hydrocarbons contain low water content, use KF reagent of low factor.
5) Obtain the factor of Karl Fischer reagent using the solvent in advance.

4. Post-measurement care

After the reagent is drained out and the electrode is cleaned, keep the titration flask filled with extracting solvent.

5.Test equipment

Main unit : Karl Fischer moisture titration volumetric system
Electrode : Twin platinum electrode for KF titration

6.Reagent

Titrant : Hydranal Composit 2 (Riedel de Haen)
Solvent : Extracting medium MI (for general purpose) (Hayashi Chemicals)

7.Measurement procedure

-Pretreatment-
1) Prepare approximately 30mL extracting medium in the titration cell.
2) Dehydrate the measuring cell by performing pre-titration in advance.

-Measurement-
1) Prepare approximately 10mL sample with a syringe.
2) Weigh the syringe on an electronic balance of reading to the nearest 0.1mg.
3) Transfer the sample in syringe to titration cell to dissolve.
4) Press Start key of titration unit.
5) Weigh the sampler of the above 3).
6) Enter the weight of item 2) for Wt1, and 5) for Wt2.
7) Obtain water content from titration volume, of which EP is detected automatically.

8.Formula

Moisture (%) = ((Data × F − Blank) / (Wt1 − Wt2)) × 0.1

Data	:	Titration volume (mL)
F	:	Factor of titrant(mg H_2O / mL)
Blank	:	Blank level (mg)
Wt1	:	Sample + Syringe (g)
Wt2	:	Empty syringe (g)

9.Example of measurement

-Titration parameter-

MKV-710M/S,MKA-610	MKA-520	MKS-500
Method No. 1 [Titration] Titr.mode Normal t(stir) 0 s t(wait) 10 s t(max) 0 s t(interval) 0 s Max.volume 10 mL Titr.bur.No. 1 Dose mode Off [Control] End time 30 s Final vol. 0.01 mL Titr.speed 3 Detect.mode 1 Drift titr. On Start mode Manual End level 75 mV Samp.time 5 s Stir.speed 4	[Titration] Method 1 Titr Mode Normal Titr Buret No. 1 End Time 30 s Final Vol. 0.01 mL Titr.Speed 3 Detector Mode 1 t(stir) 0 s t(wait) 10 s t(max) 0 s Drift Titr On Start Manual Max.Volume 10 mL Dose mode Off Oven Off	[Titration] Method Direct Titr.Speed 3 End Time 30 s Final Vol. 0.01 mL Detector Mode Normal t(stir) 0 s t(max) 0 s Drift Titr. On Max.Volume 10 mL

-Calculation parameter-

MKV-710M/S,MKA-610	MKA-520	MKS-500
[Calculation] Calc.type Sample Blank No. 1 Calc.No. 2 Unit % Decimal 3 Fraction Round (Half adjust) Drift comp. Off Evalution Off	[Calculation] Calc. 2 Unit % Weight Variable	[Calculation] g->%

－Measurement results－

Sample name	Water content	
	mg	%
n-Heptane	0.30	0.004
Cyclohexane	0.63	0.008
n-Hexane	0.49	0.007
Benzene	1.41	0.016
Ethylbenzene	0.43	0.005
Isoocatne	0.21	0.003
Tolune	0.94	0.011
n-Pentane	0.20	0.003
Styrenemonomer	0.54	0.006
Petroleum ether	0.33	0.005

Sample name	Water content	
	mg	%
Decahydronaphthalene	0.35	0.004
Tetralin	0.31	0.003
n-Hexane	1.45	0.020
Xylene	0.36	0.004
o- Xylene	0.88	0.010
m- Xylene	1.55	0.018
p- Xylene	1.63	0.019
Cyclohaxane	1.48	0.018
Methylcyclohaxane	0.23	0.003
n-Octane	0.28	0.004

Solvent MI is used for extracting medium.

10.Summary

Hydrocarbons are general term for compounds made of carbon and hydrogen atom only.

The test sample in this application dissolves in solvent MI, which makes moisture titration performed with ease.

Stable measurement of water content is assured by Karl Fischer moisture titration.

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