KEM **Application Note** №KVX-01516

Food

Water Content of Chewing Gum

Volumetric titration (indirect method)by
Karl Fischer Moisture Titrator

Standard	JIS	K 0113	Hydranal manual	
	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 for measurement of water content of chewing gum. This type of food samples are often hard to dissolve in KF solvent with side reaction, and therefore, the indirect method using an oven to evaporate moisture in sample is generally practiced.

The test sample is first heated in the oven, and the evaporated moisture is transferred to solvent by carrier gas where moisture titration is performed according to JIS K 0113-2005 Standard Test Method by Potentiometric, Amperometrtic, Coulometric and Karl Fischer Titration

For indirect method, the extracting solvent ME from Riedel de Haen is used.

2.Reference

1) JIS K 0113-2005: Standard Test Method by Potentiometric, Amperometrtic, Coulometric and Karl Fischer Titration
2) ASTM E 203-96 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 from 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) Utmost care must be taken in handling a sample with trace amount of water in it.
3) Obtain the factor of Karl Fischer reagent using the solvent in advance.

4. Post-measurement care

After the reagent in flask is drained out and the electrode is cleaned, keep the titration flask with extracting medium in it.

5.Test equipment

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

6.Reagent

Reagent : Hydranal Composit 2 (Riedel de Haen)
Solvent : Extracting medium ME (for gas) (Hayashi Chemicals)

7.Measurement procedure

-Preparation-
1) Prepare approximately 50mL ME solvent in the titration cell.
2) Dehydrate the measuring cell by performing pretitration in advance.
3) Set the oven to 150°C and maintain the temperature.
4) Purge the evaporating system with carrier gas.

—Measurement—
1) Press Start key of oven. (Start back purge and cell purge)
2) Take approximately 0.25g sample with sampler.
3) Weigh the sampler on balance of which resolution is to the nearest 0.1mg.
4) After cell purge, discharge the sampler with sample in it onto the sample boat through sample inlet of heating unit.
5) Press Start key to move the boat into the oven. Again press Start key of titrator to start titration.
6) Weigh the sampler after the sample is discharged.
7) Enter Wt1 with the weight of above 3),and Wt2 with 6).
8) After titration, obtain water content from titration volume.

8.Formula

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

Data	:	Titration volume (mL)
F	:	Factor of titrant
Blank	:	Blank level (mg)
Wt1	:	Sample + sampler (g)
Wt2	:	Weight of empty sampler (g)

9.Example of measurement

-Titration parameter-

MKA-610		MKA-520		MKS-500	
Method No.	1	[Titration]		[Titration]	
		Method	1	Method	Driect
[Titration]		Titr Mode	Normal	Titr.Speed	3
Titr.mode	Normal	Titr Buret No.	1	End Time	0 s
t(stir)	0 s	End Time	0 s	Final Vol.	0.01 mL
t(wait)	10 s	Final Vol.	0.01 mL	Detector Mode	Normal
t(max)	1200 s	Titr.Speed	3	t(stir)	0 s
t(interval)	0 s	Detector Mode	1	t(max)	1200 s
Max.volume	10 mL	t(stir)	0 s	Drift Titr.	On
Titr.bur.No.	1	t(wait)	10 s	Max.Volume	10 mL
Dose mode	Off	t(max)	1200 s		
		Drift Titr	On		
[Control]		Start	Manual		
End time	0 s	Max.Volume	10 mL		
Final vol.	0.01 mL	Dose mode	Off		
Titr.speed	3	Oven	ADP-		
Detect.mode	1	Oven Temp.	150℃		
Drift titr.	On	Pre Treat	2		
Start mode	Manual	Back Purge	180 s		
End level	75 mV	Cell Purge	120 s		
Samp.time	5 s				
Stir.speed	3				
[Option]					
Pre treat	2				
Cell purge	120 s				
Back purge	180 s				
Heat.mode	Set				
Oven temp.	150 C				

-Calculation parameter-

MKA-610		MKA-520		MKS-500
[Calculation]		[Calculation]		[Calculation]
Calc.type	Sample	Calc.	2	g->%
Blank No.	1	Unit	%	
Calc.No.	2	Weight	Variable	
Unit	%			
Decimal	2			
Fraction	Half adjust			
Drift comp.	Off			
Evalution	Off			

－Measurement results－

Sample name	Sample (g)	Extracting medium	Water content	
			mg	%
Chewing gum	0.2612	Solvent ME	5.4786	2.09

Oven temperature: 150°C

10.Summary

The word Chewing gum comes from rubber to chew. It is made of gum flavored with taste and aroma so that people can enjoy chewing. It is often called just Gum. The main material of natural resin of boiled chicle comes from sapotaceous Achras sapota in South America.

The sample test has been successfully conducted by using the evaporator. The moisture from the sample is delivered to solvent ME in titration cell by carrier gas.

Precise and reliable water content can be obtained by Karl Fischer moisture titration system.

Moisture of chewing gum can be measured by any of the following Karl Fischer titration systems manufactured by Kyoto Electronics (KEM).

【MKA-610】

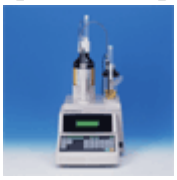
Awarded Product of Supreme Technology from Kyoto City

- Easy key entry by touch panel on 8-inch large color LCD
- Two measurements in parallel at a time
- Both potentiometric and Karl Fischer moisture titration (coulometric・volumetric) can be performed at a time

【MKA-520】

- Compact and cost performance
- Easy dispensing of extracting medium both discharge and drain out
- One touch change over of burette unit

【MKS-500】



- Low cost and high performance
- User friendly easy to operate
- Titration nozzle made of PTFE both anti-diffusion and regular type are standard equipped

KEM KYOTO ELECTRONICS MANUFACTURING CO.,LTD.

Overseas Division: Yamawaki Bldg 9F,4-8-21 Kudan-minami,Chiyoda-ku, Tokyo 102-0074 JAPAN
Phone: +81-3-3239-7333, Fax: +81-3-3237-0537
Head Office: 56-2 Ninodan-cho,Shinden,Kisshoin,Minami-ku, Kyoto 601-8317 JAPAN
Phone: +81-75-691-4122, Fax: +81-75-691-9961
URL: http://www.kyoto-kem.com