KEM **Application Note** №KVX-01516

Food

Water Content of Chewing Gum

Volumetric titration (Evaporation 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 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 203-16 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 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(mg H_2O / mL)
Blank : Blank level (mg)
Wt1 : Sample + sampler (g)
Wt2 : Weight of empty sampler (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) 1200 s t(interval) 0 s Max.volume 10 mL Titr.bur.No. 1 Dose mode Off [Control] End time 0 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 [Option] Pre treat 2 Cell purge 120 s Back purge 180 s Heat.mode Set Oven temp. 150 C	[Titration] Method 1 Titr Mode Normal Titr Buret No. 1 End Time 0 s Final Vol. 0.01 mL Titr.Speed 3 Detector Mode 1 t(stir) 0 s t(wait) 10 s t(max) 1200 s Drift Titr On Start Manual Max.Volume 10 mL Dose mode Off Oven ADP- Oven Temp. 150℃ Pre Treat 2 Back Purge 180 s Cell Purge 120 s	[Titration] Method Driect Titr.Speed 3 End Time 0 s Final Vol. 0.01 mL Detector Mode Normal t(stir) 0 s t(max) 1200 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 2 Fraction Round (Half adjust) Drift comp. Off Evalution Off	[Calculation] Calc. 2 Unit % Weight Variable	[Calculation] g->%

Evaporator

Flow rate 200mL/min	Flow rate 200mL/min	Flow rate 200mL/min Oven temp. 150 C

－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.

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