

Cosmetics
Soap

Water Content of Toiletry

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 according to JIS K 0113-2005 for measurement of water content in toiletry, which dissolves with ease in MI (for general purpose) extracting medium.

The test method can measure the following products:

Skin lotion, pack, hair tonic, hair lotion, milky lotion, shampoo, rinse

2. Reference

- 1) JIS K 0113-2005 : Standard Test Method by Potentiometric, Amperometric, 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) For high water content of sample, minimize sample size and use KF reagent of higher factor.
- 4) 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 5 (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 0.05~0.2g sample with a syringe.
- 2) Weigh the syringe on an electronic balance of which precision is 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

$$\text{Moisture (\%)} = ((\text{Data} \times \text{F} - \text{Blank}) / (\text{Wt1} - \text{Wt2})) \times 0.1$$

Data : Titration volume (mL)

F : Factor of titrant (mg H₂O /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 Driect 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 2 Fraction Round (Half adjust) Drift comp. Off Evaluation Off	[Calculation] Calc. 2 Unit % Weight Variable	[Calculation] g->%

– Measurement results –

Sample name	Sample (g)	Extracting medium	Water content	
			mg	%
Skin lotion	0.0729	Solvent MI	59.6201	81.78
Pack	0.1557	Solvent MI	89.1202	57.22
Hair tonic	0.1350	Solvent MI	11.1262	8.24
Hair lotion	0.0686	Solvent MI	20.6891	30.16
Milky lotion	0.0985	Solvent MI	75.5101	77.68
Shampoo	0.0678	Solvent MI	43.3201	63.89
Rinse	0.0558	Solvent MI	52.5870	94.24

10. Summary

Toiletry is a general term of products for cleaning the body or personal taste.

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.