Application Note

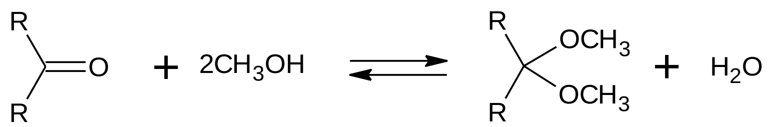
Measuring the moisture in acetone

Industry	Chemicals
Instrument	Karl Fischer Moisture Titrator
Measurement method	Coulometric Titration/Direct method
Standards	

1. Scope

Acetone is a solvent for paints, a pharmaceutical, a coupling agent, a nail polish remover, a cleaner for testing equipment, and is even used in the food products field as a precipitant in the manufacture of sugar and starch. In such applications, if the moisture in the acetone influences the quality of products, it must be controlled. This Application Note describes an example of measuring the moisture in acetone using the Karl Fischer method.

In the Karl Fischer method, acetone and other ketones react with methanol, as shown below, producing water, which interferes with the results.



Therefore, general purpose anolytes that contain methanol cannot be used. It is necessary to use anolytes for ketones containing low reactivity alcohols as a substitute for methanol.

2. Precautions

Organic solvents are used, so place the Karl Fischer moisture titrator inside a fume hood.

Note: The interference is not completely avoided by using an anolyte for ketones. If the titration does not finish or it takes time for the drift value to drop, assume that the capacity of the anolyte to control the interference has been reached, and replace the anolyte.

3. Post-measurement procedure

Drain the anolyte and catholyte. Then clean the titration flask, the twin platinum electrode, and the inner burette with toluene. If alcohol is used as the cleaning liquid, when the acetone is measured at the next step, residual alcohol on the partition of the electrolytic electrode might interfere with the measurement.

4. Apparatus

Main unit	Karl Fischer moisture titrator (Coulometric titration)
Electrode	Twin platinum electrode, two component inner burette

5. Reagents

Anolyte	KEM AQUA AKE
Catholyte	KEM AQUA CGE

6. Procedure

—Preparation—

1) Fill the titration flask with approximately 100 mL of the anolyte.
2) Fill the electrolytic electrode with approximately 5 mL of the catholyte.
3) Perform a preliminary titration and dehydrate the inside of the titration cell.

—Measurement—

1) Using a syringe, collect the sample and weigh it.
2) Inject the sample using the side plug for the syringe and measure the moisture.
3) After injecting the sample, weigh the syringe.
4) The difference in the weight of the syringe before and after sample injection corresponds to the amount collected.
5) The measurement finishes when the moisture content per unit time (μg/s) falls below the initial drift value (μg/s) + the relative drift value (μg/s).

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7. Formula

Moisture (ppm) = ((Data - Drift × t - Blank)/(Wt1 - Wt2)) × F × 1

Data	Total moisture content (μg)
Drift	Initial drift value (μg/s)
Blank	Blank test value (0 μg)
t	Measurement time (s)
Wt1	Weight of the syringe before injecting the sample (g)
Wt2	Weight of the syringe after injecting the sample (g)
F	Factor value (1.0)

8. Example of measurement

— Titration parameter —

＜Titr.Para＞		**＜Ctrl.Para＞**	
Titration mode	H_2O	Cell type	2-comp.
t(stir)	0s	Stable	0.1μg/min
t(wait)	30s	Ctrl. gain	5.0
t(max)	0s	E. speed	Standard
Drift stop	Rel	End level	200mV
Drift	0.1μg/s	Start mode	Auto
		Sample time	5s
		Stirrer speed	3

(The above condition is an example. The setting condition depends on the model.)

— Example of Titration curve —

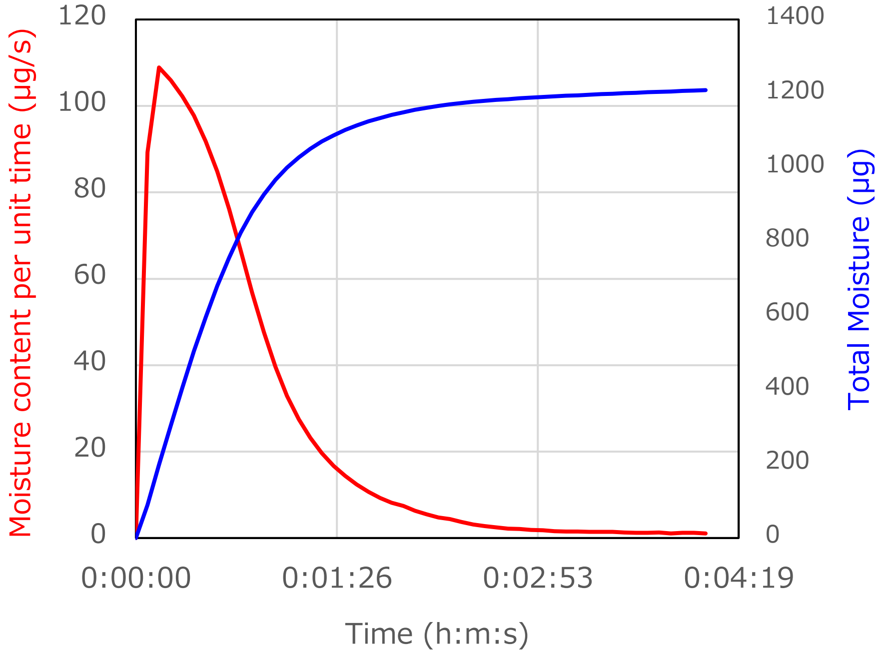

Table 1 Moisture of Acetone

	Sample (g)	Moisture (µg)	Concentration (ppm)
1	1.5886	1177.6	741.3
2	1.6844	1252.4	743.5
3	1.4774	1099.3	744.1
Mean	-	-	743.0
SD	-	-	1.5
RSD (%)	-	-	0.2