

Food

Total Acid (Free Acid) of Sake Wine

Acid·base titration by
Automatic Potentiometric Titrator

Standard

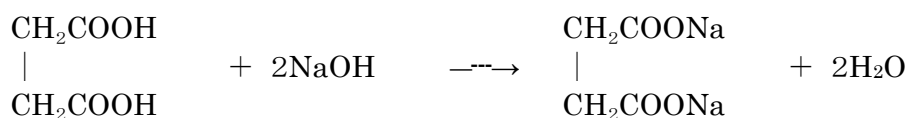
Test method by National Tax
Administration

1. Abstract

The acids contained in Japanese sake wine or synthetic sake are organic acids mainly of succinic acid and lactic acid, and among them of all, total free organic acids are related to quality of sake.

Determination of total free acids in sake wine is prescribed in National Tax Bureau (3 Sake, Synthetic sake·3-5 Test method for Total acid (Free acid) where acid·base titration with sodium hydroxide is stipulated.

Titrate with 0.1mol/L sodium hydroxide up to pH 7.2 and obtain total acid (free acid) by converting titration volume to succinic acid in total.



2. Reference

- 1) Test method prescribed by National Tax Administration Agency (Instruction No. 6, revised in 2007)

3. Cautions in measurement

- 1) Use a combination glass electrode for micro titration since 10mL sample is titrated without dilution.
- 2) It is recommended to use not only electrode but titration cell unit for micro titration in order to avoid the effect of carbon dioxide gas in the air.
- 3) Obtain factor of titrant 0.1mol/L sodium hydroxide using sulfuric amide according to JIS K8001 General Rule of Test Method and ISO 6531-1.
- 4) Store titrant 0.1mol/L sodium hydroxide in zeolite to prevent ambient carbon dioxide from permeation.
- 5) Filter the sample to remove fruits particles in order to obtain good repeatability.

4. Post-measurement care

After the electrode is rinsed with pure water, keep its tip dipped in a beaker filled with pure water in order to avoid it from drying up.

5. Test equipment

Main unit : Automatic potentiometric titrator (Standard preamplifier: STD—)
Electrode : Option Combination glass electrode (for micro titration)
 Standard Temperature compensation electrode
Option : Micro titration cell unit

6. Reagent

Reagent : 0.1mol/L sodium hydroxide (f=1.000)

7. Measurement procedure

—Measurement—

- 1) Sample 10mL.
- 2) Titrate with 0.1mol/L sodium hydroxide to obtain acidity and succinic acid.

8. Formula

Acidity = EP1 × TF

Succinic acid (g/100mL) = EP1 × TF × C1 × K1

EP1 : Titration volume (mL)

TF : Factor of titrant (1.000)

C1 : Concentration conversion coefficient (5.9 mg/mL)

(Succinic acid (mg) equivalent to 1mL of 0.1mol/L NaOH)

K1 : Unit conversion coefficient (0.01)

9.Example of measurement

— Ambient condition —

Room temperature : 23.0 °C	Humidity : 47 %	Weather : Cloudy
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-Titration parameter-

Model : AT-510	
Method No. : 12	
<Auto Titration>	
<Titration>	
Form : Level Stop	<Calculation>
APB No. : 1	Calc.Type : Sample
Unit No. : 1	Conc.1 : Set
Detector No. : 1	CO1=EP1*TF
Unit : pH	Unit :
Max. Volume : 20.0mL	EP No. : 1
Wait Time : 0s	Conc.2 : Set
Direction : Positive	CO1=EP1*TF*C1*K1
	Unit : g/100mL
	EP No. : 1
<Control>	
End Point No. : 1	Temp.Comp. : Off
1st Level : 7.2pH	<Constant>
Over Titr.Vol. : 0mL	C1(mg/mL) : 5.9
Gain : 1	K1 : 0.01
Data samp.Pot. : 4.0mV	
Data samp.Vol. : 0.5mL	
Control Speed : Slow	[Titr. constant]
	Factor : 1.000

-Titration curve-

*** Result ***	
Sample No. : 70-01	
Date : 1999/08/17 16:21	
Sample ID :	
Method No. : 12	
<Auto Titration>	
Method Name :	
Titr. Time : 00:05:19	
Size : 10.0mL	
Conc-1 : 1.3243	
Conc-2 : 0.0781g/100mL	
End point-1	
Volume : 1.3243mL	
Potential : 7.20pH	

(The above parameters and titration curve are printed out by AT-510)

«Titration parameter»

Form: of titration / APB No. the burette used in titration / Unit No.: APB Unit File number used in titration

Detector No.: the detector used in titration / Max Volume. of titration / Wait Time: before titration starts

Direction.: of titration

«Control parameter»

End Point No. number of EPs detected / 1st Level: potential of the first EP / Over Titr.Vol. over-titration volume

Gain: sensitivity of detection signal / Data samp.Pot.: potential changes of sampling signal / Data samp.Vol.: titration volume of sampling signal / Control Speed: of titration

«Result parameter»

Calc.Type: of formula / Conc.x formula 1 / Unit of result / EP No. for calculation

Temp.Comp. temperature compensation of titration liquid/ C1(mg/mL) concentration conversion coefficient

K1: unit conversion coefficient / Factor: of reagent / Blank 1: blank level 1

– Measurement results –

N	Sample (mL)	Titration (mL)	Acidity	Succinic acid (g/100mL)
1	<u>10.0</u>	<u>1.3243</u>	<u>1.3243</u>	<u>0.0781</u>
2	10.0	1.3177	1.3177	0.0777
3	10.0	1.3230	1.3230	0.0781

Acidity and Succinic acid		
	Acidity	Succinic acid
Mean	1.3217	0.0780g/100mL
SD	0.0035	0.0002g/100mL
RSD	0.2645%	0.2962%

* The above results were obtained by 3 tests of the same sample.

* Red underline shows the data from page 3/4.

10. Summary

Sake wine is an alcoholic beverage which contains ethanol (ethyl alcohol).

Quality control and evaluation of sake depends on total acids, of which measurement is of extreme importance.

The sample measurement shows a good repeatability with less than 0.3% relative standard deviation. Precise and reliable measurement is assured by the automated potentiometry.

The analysis of total acid of alcoholic beverage can be perfectly made by any of the following titration systems manufactured by Kyoto Electronics (KEM).

【AT-610】



Awarded Product of Supreme Technology from Kyoto City

- Easy key entry by touch panel of large color LCD (8-inch wide)
- Simultaneous titration in parallel
- Both potentiometric and Karl Fischer moisture titration (coulometric·volumetric) can be performed at a time.

【AT-510】



- Compact and cost performance model
- PC card expands data memory for convenience and versatility.

【AT-500N-1】



- Low cost and high performance
- Easy view with back light LCD
- GLP/GMP conformed model

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