

Food

Acidity of vinegar-flavored soy sauce

Automatic Potentiometric Titrator
Acid-base titration

Standard

1. Abstract

The acidity of vinegar-flavored soy sauce was titrated by potentiometric titration method with 0.5 mol / L sodium hydroxide solution to pH 8.2. Calculate the acidity as acetic acid concentration from the titration amount of the sodium hydroxide solution required to the end point.

2. Reference

- 1) Japan Agriculture Standards for Brewed Vinegar

3. Cautions in measurement

- 1) Obtain the factor in advance of 0.5ml/L sodium hydroxide reagent for measurement of acidity using amide sulfate according to JIS K8001 General Principle of Test Method and ISO 6531-1.
- 2) Keep 0.5ml/L sodium hydroxide reagent in zeolite poly-container to prevent ambient carbon dioxide from permeation.
- 3) Use pure water for dilution without carbon dioxide gas dissolved in it.
- 4) If the sample contains particles like grape pulp, it may cause measurement error. Filter such sample in advance.

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 : Combination glass electrode
Temperature compensation electrode

6. Reagent

Reagent : 0.5mol/L sodium hydroxide (f=1.0235)

7. Measurement procedure

—Measurement—

- 1) Deliver 5mL sample into a 200mL beaker.
- 2) Add pure water to make it total 125mL.
- 3) Titrate with 0.5mol/L sodium hydroxide to obtain acidity.

8. Formula

$$\text{Acidity (\%)} = (EP1 - BL1) \times TF1 \times C1 \times K1 / S$$

EP1 : Titration volume (mL)

BL1 : Blank level (0.0mL)

TF1 : Reagent factor (1.0235)

C1 : Concentration conversion coefficient (30mg/mL)

(Acetic acid (mg) equivalent to 1mL of 0.5mol/L NaOH)

K1 : Unit conversion coefficient (0.1)

S : Sample size (mL)

9. Example of measurement

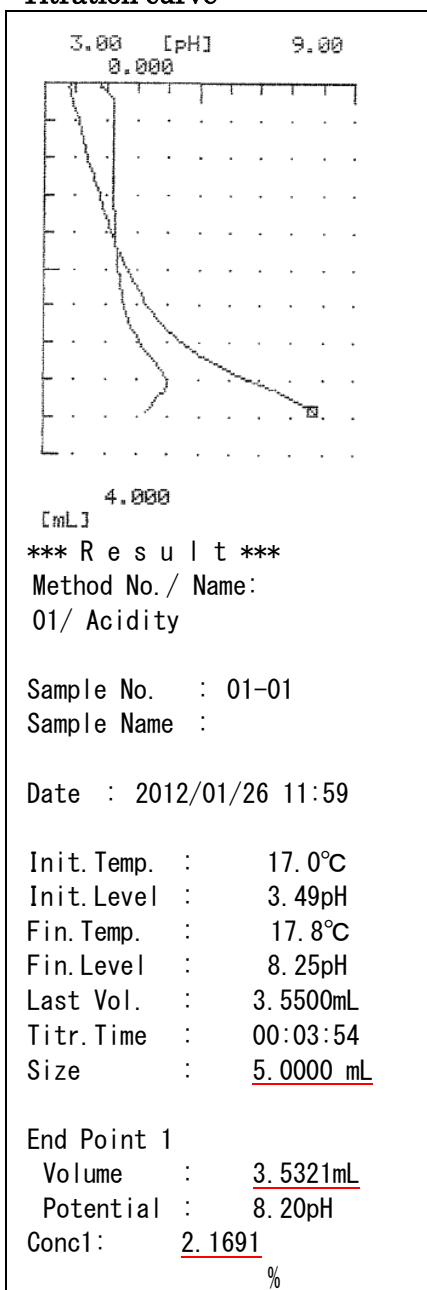
— Ambient condition —

Room temperature : 20.0 °C	Humidity : 57 %	Weather : Cloudy
----------------------------	-----------------	------------------

-Titration parameter-

Model : AT-700	[Blank List]
Method No./Name : 01/Acidity	BL1 : 0.0000
[Titration]	[Factor List]
Titr. Mode : Auto Inter.	TF1 : 1.02350
Titr. Form : Level	
Blank Mode : Off	
Burette No. : 01	
Ch./Unit : Ch1/pH	
Direction : Auto	
Max Vol. : 20.0000mL	
Wait Time : 0s	
Dose Mode : None	
[Control]	
Number of EP : 1	
1st End Level : 8.2	
Gain : 1	
Ctl. Speed : Medium	
Stir. Speed : 4	
[Calculation]	
Calc. Type : Sample	
CO1 : Set	
Formula (EP1-BL1)*TF1*C1*K1/S	
Unit : %	
EP No. : 1	
Temp. Comp. : Off	
[Constant]	
C1 : 30.0	
K1 : 0.1	

-Titration curve-



(The above parameters and titration curve are printed out by AT-700)

<p>« Titration parameter »</p> <p>Titr. Mode: Titration mode / Titr. Form: titration form / Blank Mode: Blank mode / Burette No.: number of burette / Ch./Unit: selection of detector number and potential unit for detection / Direction: of titration Max Vol.: Max Volume of titration / Wait Time: before titration starts / Dose Mode: the way of fixed dose</p> <p>« Control parameter »</p> <p>Number of EP: the number of endpoints / 1st End Level: potential of the first EP / Gain: sensitivity of signal / Ctl. speed: Control speed / Stir. speed: Stirrer speed</p> <p>« Calculation parameter »</p> <p>Calc. type: calculation type / CO1: concentration formula 1 / Formula: Formula / Unit: of calculated results / EP No.: EP position to carry out computation / Temp. Comp.: temperature compensation</p> <p>« Constant parameter »</p> <p>C1(mg/mL): concentration conversion coefficient / K1: unit conversion coefficient / Blank1: blank level / TF1: factor of reagent</p>

–Measurement results–

n	Sample (mL)	Titration (mL)	Acidity (%)
1	5.00	<u>3.5321</u>	<u>2.1691</u>
2	5.00	3.5038	2.1517
3	5.00	3.5115	2.1564

Statistics		
Mean	2.1591	%
SD	0.0090	%
RSD	0.4162	%

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

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

10. Summary

Acidity is important measurement item in the evaluation and quality control for seasonings. In this measurement, good repeatability was obtained with relative standard deviation of 0.5%.

Stable measurement is possible by using automatic potentiometric titrator.