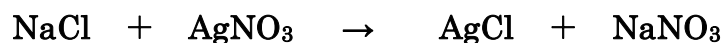


HIRANUMA APPLICATION DATA	Automatic Titrator	Data No.	A1	Apr. 19, 2018
FOOD	Salt content in soy sauce			

1. Abstract

The determination method of salt content in soy sauce is described as “Measurement of Salt Content” in *JAS (Japanese Agriculture Standard)*. Potentiometric titration and Mohr method is defined in *JAS* as determination method of salt content, potentiometric titration is more common method because of its ease and high precision. The sample is acidified by nitric acid and the concentration of salt is determined by precipitation titration with silver nitrate titrant using the silver electrode.



2. Configuration of instruments and reagents

(1) Instruments

Main unit : Hiranuma Automatic Titrator COM Series
 Electrode : Silver combination electrode AGR-811Z (Double Junction Type)

*The following electrodes are also usable.

- AGR-801Z (Silver reference combination electrode)
- Combination of AG-311 (Silver indicator electrode) and MS-231Z (Silver reference electrode)
- Combination of AG-311 and RE-241Z (Double junction type silver reference electrode)

*Remark

The general reference electrode (RE-201Z) cannot be used for this titration because KCl inner solution might come out to sample solution and it causes measurement error.

The inner electrodes of AGR-801Z and MS-231Z use mercury (I) sulfate. When these electrodes are disposed, please ask the specialized industrial waste disposal operator.

(2) Reagents

Titrant : 0.1 mol/L Silver nitrate standard solution
 Additive : Diluted nitric acid (1:1, v/v) 1 mL

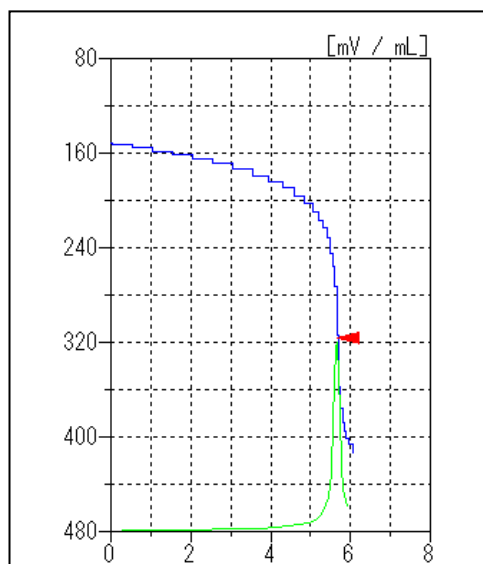
3. Measurement procedure

- (1) Take 5 ml of sample by volumetric pipette accurately and dilute it to 250 ml with volumetric flask.
- (2) Take 10 ml of above sample into a 100 ml beaker.
- (3) Add 50 ml of DI water.
- (4) Add 1 ml of diluted nitric acid.
- (5) Immerse the electrodes and titrate with 0.1 mol/L standard silver nitrate solution.

4. Measurement conditions and results

Examples of titration conditions

Cndt No.	1	ConstantNo.	1	Mode No.	4
Method	Auto	Size	0.2 mL	Pre Int	0 sec
Buret No.	1	Blank	0 mL	Del K	9
Amp No.	2	Molarity	0.1 mol/L	Del Sens	0 mV
D. Unit	mV	Factor	1.004	Int Time	3 sec
S-Timer	5 sec	K	58.44	Int Sens	3 mV
C.P. mL	0 mL	L	0	Brt Speed	2
T Timer	0 sec	Unit	%	Pulse	40
D.P. mL	0 mL	Formula	(D-B)*K*F*M/(S*10)		
End Sens	300	Digits	3		
Over mL	0.3 mL	Auto In Pram.	Non		
Max.Vol.	20 mL				



Example of titration curve

Measurement results

Number of measurement	Size (mL)	Titrant volume (mL)	Salt concentration (%)
1		5.653	16.584
2	0.2 ※	5.652	16.581
3		5.656	16.593
		Avg.	16.59 %
		SD	0.006 %
		RSD	0.04 %

*Actual sample volume will be 0.2 mL (10/50) because 10 ml of 50-fold diluted sample is used.

5. Note

“Int time” should be set to longer than usual, because the generating speed of silver chloride would get slower near the end point and the lower temperature would decrease the response speed. It would improve the measurement accuracy.

Keywords : Soy source, Salt content, Precipitation titration, Silver electrode, Silver nitrate

*Some measurement would not be possible depending on optional configuration of system.