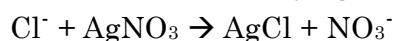


AQUACOUNTER Application Sheet	COM series	DATA No. A1	1st edition
Food and Beverage	Measurement of salt in soy sauce		

1. Measurement outline

The most popular method for quantification of high-concentration salt in soy sauce or sauce is the silver nitrate titration using a silver indicator electrode. The sample is titrated with silver nitrate titrant after acidifying the sample with nitric acid to mask the carbonate, etc.



2. Reagents and Electrodes

(1) Reagents	Titrant	0.05mol/L silver nitrate titrant
	Loading buffer	(1+5) nitric acid
(2) Electrodes	Indicator electrode	Silver indicator electrode AG-311 to IE jack (P/N E231245-A)
	Reference electrode	Silver reference electrode MS-231 to RE jack (P/N D231243-A)
	Note) Reference electrode RE-201 cannot be used. Silver reference combination electrode AGR-801 may also be used.	

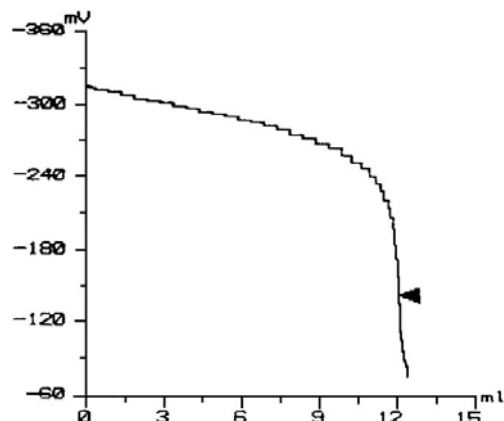
3. Measurement conditions example (for COM-1600S)

Master File No.1	
Condition file: 1	
Parameters for Condition file 1	
Method	AUTO
Buret No.	1
Meas Unit	mV
S-Timer	5 sec
CP	0 mL
DP	0 mL
Direction	N/A
End Sens	300
Over mL	0 mL
Max Vol	20 mL
Mode No.	5
Unit	%
Formula	(D-B)×K×F×M/(S×10) (To be set automatically)
Blank	0
Molarity	0.05
Factor	Titre of the titrant
K	58.44 (As NaCl)

4. Measurement Procedure

Take ca. 0.2g of sample. Weigh accurately. Add 50mL of deionized water, 1mL of (1+5) nitric acid and titrate with 0.05mol/L silver nitrate titrant.

5. Measurement example



Measurement result

Sample No.	Sample volume (g)	Titration value (mL)	Concentration (%)
1	0.2036	12.033	17.34
2	0.2129	12.601	17.36
3	0.2166	12.819	17.36
4	0.2099	12.407	17.34
5	0.2102	12.431	17.35
6	0.2035	12.044	17.36
Avg. (Average value)			17.35 %
Std. Dev. (Standard deviation)			0.01 %
C.V. (Coefficient of variation)			0.06 %

6. Notes

Note the following points to improve measurement precision and obtain good measurement results:

- (1) Sample should be collected by weight since the salt concentration is high.
- (2) Since generation of AgCl is relatively slow near the titration end point, select slower MODE No.
- (3) AgCl precipitate may stick on the indicator electrode and it may decrease the sensitivity of the electrode. Wipe the tip of the indicator electrode with soft paper after the titration.

Key words

Food product, soy sauce, silver electrode,

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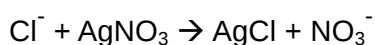
<http://www.hiranuma.com>

Category	Potentiometric titration series COM series
Food & Beverage	Salt content in soy sauce by Silver nitrate titration
Referenced methods	JAS standard for soy sauce

Key words; Salt in food, chloride ion, NaCl, soy sauce, silver nitrate

Outline

One of the most typical and popular methods for quantification of high-concentration salt in soy sauce or seasoning oils and sauces is the silver nitrate titration. The sample is titrated with silver nitrate titrant solution after acidifying the sample with nitric acid to mask carbonate, etc.



Reagents

Titrant : 0.1mol/L silver nitrate solution
Buffer : (1+5) nitric acid

Instruments and Electrodes

Recommended automatic titrator **COM-1700S / COM-1600S / COM-300A**

- **AG-311** Silver indicator electrode (option, P/N E231245-A)
 - **MS-231** Reference electrode (option, P/N D231243-A) *K₂SO₄ electrolyte solution contained.
- ※**AGR-801** Silver reference combination electrode (option, P/N D252415-A) is also available.



COM-300A
Simple & compact



COM-1600ST
(incl. optional thermal printer PR-2000T2)
Robust & expandable



COM-1700S (built-in printer)
(incl. optional thermal printer PR-2000T2)
Tough panel & flexible data handling



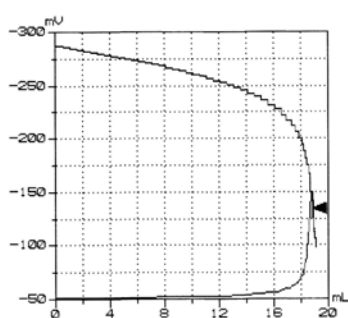
More Automation!

COM-1600STC12 Automatic potentiometric titrator
w/ 12-position sample changer

Condition parameters

Method	Auto	Unit	%	Mode	9
Amp. No.	2	Size	--- g	Pre Int	0 sec
Buret No.	1	Blank	0 mL	Del K	9
Meas. Unit	mV	Factor	1 or *factor of titrant	Del Sens	0 mV
S Timer	10 sec	Molarity	0.1	Int Time	3 sec
CP mL	0 mL	K	58.44 (as NaCl)	Int Sens	3 mV
T Timer	0 sec	L	0	Brk Speed	2
DP mL	0 mL	Formula	(D-B)×K×F×M/(S×10)	Pulse	40
End Sens	300				
Over mL	0.2 mL				
Max Volume	20 mL				

Useful information



Initial Temp -287.3 mV
20.0 °C
EP -134.1 mV
18.801 mL
dE/dV 1834
SIZE 5.00000 g
*Conc 18.3103 %

The following points will be effective to improve measurement precision and accuracy.

- 1) Collecting the sample by weight not by volume, especially when the concentration is high.
- 2) Selecting a Mode No. for slow titration
- 3) Wiping the tip of indicator electrode with soft paper after the titration because precipitate AgCl may stick on the indicator electrode and it may decrease the electrode sensitivity.

-Titration curve example-

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