Sheet No.
GT200-FO003 Food & Bevarage

Salt Content Analysis of Dark Soy Sauce

Method : Precipitation titration
Apparatus : Automatic Titrator GT-200
Electrode: Double junction reference electrode, Silver detection electrode
Reference electrode inner
solution: 1 mol/L potassium chloride solution
Reference electrode outer
solution: 1 mol/L potassium nitrate solution
Titration mode : INF, Detection: mV
Related standard : Japanese Agricultural Standards
Japanese Agricultural Standards for Soy Sauce
Unsalted soluble solid contents and salt content: (Potentiometric titration)

*This sheet is provided as information. It is not to guarantee the analysis values. Please use under the ideal conditions considering external factors including the analysis environment and properties of the sample.

Outline

Standards of dark soy sauce are stipulated by the Japanese Agricultural Standards for Soy Sauce, which specifies the salt content of special grade soy sauce to be 16% or greater by volume.

Reagents

[Titrant]
■0.1 mol/L silver nitrate solution (for volumetric analysis)
[Prepared reagents]
■Polyoxyethylene (20) sorbitan monolaurate solution: Take 1 g of polyoxyethylene (20) sorbitan monolaurate into a 200-ml beaker, add 100 ml of water and mix.
■Nitric acid (1+1): Add nitric acid to the same amount of pure water.

Analytical Procedure

[Preparation of sample solution]
Place 5 ml of soy sauce into a 250-ml volumetric flask using a volumetric pipette. Add pure water to volume up to 250 ml.
[Blank test]
(1) Place 10 ml of pure water into a 100-ml beaker using a volumetric pipette.
(2) Add 1 ml of nitric acid (1+1).
(3) Add 1 ml of polyoxyethylene (20) sorbitan monolaurate solution.
(4) Add pure water until electrodes are submerged, and titrate using 0.1 mol/L silver nitrate solution.
[Main titration]
(1) Place 10 ml of sample solution into a 100-ml beaker using a volumetric pipette.
(2) Add 1 ml of nitric acid (1+1).
(3) Add 1 ml of polyoxyethylene (20) sorbitan monolaurate solution.
(4) Add pure water until electrodes are submerged, and titrate using 0.1 mol/L silver nitrate solution.

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[Equation]

Salt content (%) = ((A1 – BL) / K1) × M × f × FW × 25 × (1/S) × 100

A1 : Titer of 0.1 mol/L silver nitrate solution in the main titration (ml)
BL : Titer of 0.1 mol/L silver nitrate solution in the blank test (ml)
K1 : 1000
M : Molarity of silver nitrate solution (0.1 mol/L)
f : Factor of 0.1 mol/L silver nitrate solution
FW : Formula weight of sodium chloride (58.44)
S : Sample amount (ml)

Other Requirements

■Carry out replacement of inner/outer solutions of the reference electrode and polishing of the silver detection electrode prior to measurement.
■Handle measurement reagents with care after reading through and understanding their labels and safety data sheets.
■Wear personal protective equipment such as protective goggles and gloves when handling the reagents.

Measurement Results

	Sample amount (ml)	Titer (ml)	Measurement value (%)
1	10	5.6097	16.4
2		5.6069	16.4
3		5.6055	16.4

Number of data	(n)	3
Average		16.4
Standard deviation	(SD)	0.0062
Relative standard deviation	(RSD%)	0.0381
Blank		0.0000 ml

Salt content of koikuchi soy sauce was measured using GT-200. Average over 3 measurements was 16.4%. Relative standard deviation (RSD%) was 0.04%, exhibiting measurement with relatively high reproducibility.

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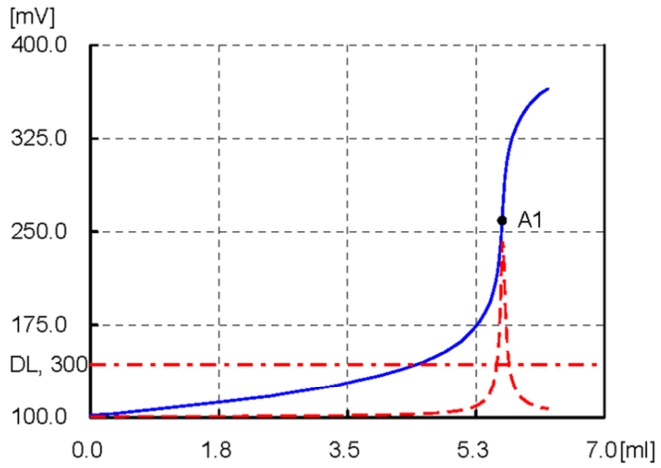
Salt Content Analysis of Dark Soy Sauce

ID No.: 15 GT No.1 User: GT-200

Measurement date : 2013/03/11 17:22
Sample name : Koikuchi soy sauce
Measurement type : Sample Titr
Sample size (S) : 5 [ml]



C1: 16.36 [%]

A1: 5.6055 [ml] 259 [mV]

Pi	: 102	[mV]			
Start	: 0	[ml]	102	[mV]	
End	: 6.23	[ml]	365	[mV]	Time: 4’ 14”

Run File No. : 0 Quick Mode
Titration File No. : 28 Salt content of soy sauce
Mode : INF End1 End1 Width: 350 [mV] ± 500 [mV]
Detect : mV1
BRT No. : 1
Reagent : 5
WTint : 0 [sec]
Vup : 300 [µl]
Vlow : 10 [µl]
dE : 2 [mV]
dT : 3 [sec]
DL : 300 [mV/ml]
DetCnt : 6
Vmax : 20 [ml] C1: ((A1-BL)/K1)*M*f*FW*25*(1/S)*100
Vover : 0.5 [ml] [%]

Reag	: 0.1M AgNO3	E	: 1	M	: 0.1 [Mol/l]
f	: 0.999	BL	: 0 [ml]	K1	: 1000
FW	: 58.44				

Buret Injection Speed: 500 [ul/sec]