Sheet No.
GT-310-FO-001 Food & Beverage

Determination of salt content of sauces

Outline

In Japan, salt content of worcester sauce is specified by Japanese Agricultural Standards (JAS). Salt content of worcester sauce is defined to be less than 11 %, medium thick sauce is less than 10% and thick sauce is less than 9%. In this application sheet, salt content of three different sauces were measured by potentiometric titration. Good measurement results were obtained with a relative standard deviation (RSD) of less than 1%.

Titration Type : Precipitation Titration
Related Standard : Japanese Agricultural Standards for Worcester Sauces, Testing method of unsalted soluble solids and salt by potentiometric titration

Apparatus

Automatic titrator : GT-310
Electrodes : REFERENCE ELECTRODE, L=105 (D-J) (GTRE10B),
SILVER ELECTRODE, L=105 (GTAG1B)
Reference electrode solution : Inner : 1 mol / L - potassium chloride in water
: Outer : 1 mol / L - potassium nitrate in water

Reagents

[Titrant] ■0.1 mol / L – silver nitrate solution
[Reagents] ■1% Polyoxyethylene (20) Sorbitan Monolaurate Solution: Weigh 1 g of polyoxyethylene (20) Sorbitan Monolaurate into a beaker, add 100 mL of water and mix.
■Nitric acid (1+1): Mix same amount of pure water and nitric acid.

Analytical Procedure

[Blank measurement]
(1) Take 0.4 g of pure water to the order of 0.1mg into a 100mL beaker.
(2) Add 50 mL (up to the level where the electrode is immersed) of pure water into the beaker.
(3) Add 1 mL of nitric acid (1+1) and 1% polyoxyethylene (20) sorbitane monolaurate solution.
(4) Titrate with 0.1 mol / L silver nitrate solution.

[Sample measurement]
(1) Take 0.4 g of sample to the order of 0.1mg into a 100mL beaker.
(2) Add 50 mL (up to the level the electrode is immersed) of pure water into the beaker.
(3) Add 1 mL of nitric acid (1+1) and 1% polyoxyethylene (20) sorbitane monolaurate solution.
(4) Titrate with 0.1 mol / L silver nitrate solution.

Sheet No.
GT-310-FO-001

Determination of salt content of sauces

[Calculation]

Salt content (%) = ((A1 - B) / X1) x Q x f x FW x (1 / W) x 100

A1 : Volume of titrant for sample measurement (mL)
B : Volume of titrant for blank measurement (mL) *1
X1 : Unit conversion factor from mL to L (= 1000)
Q : Mol concentration of titrant (= 0.1 mol / L)
f : Factor of titrant (= 0.9977) *2
FW : Formula weight of sodium chloride (= 58.44)
W : Amount of Sample (g)
100 : Unit conversion factor of %

*1 : When B is less than 0.01 mL, the volume shall be 0 mL.

*2 : Standardization was performed with reference to JIS K8001

Other Requirements

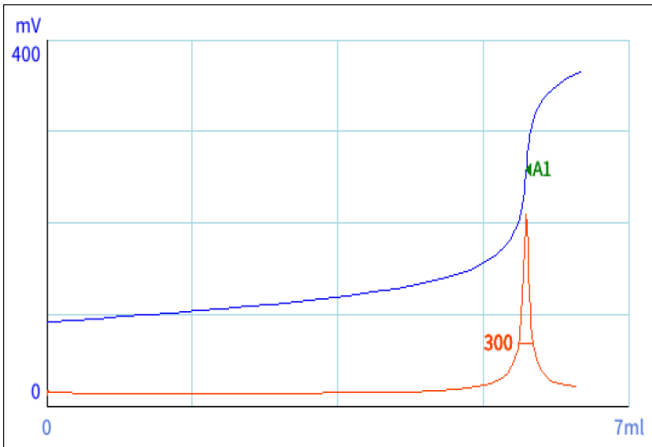
■Confirm reagent labels and safety data sheets for safety.
■Wear protective equipment (eye protector, gloves and others.) when handling reagents.
■Replace the inner solution and outer solution of the reference electrode regularly.
■Please polish the silver detection electrode before the measurement. Darkening on the surface may cause poor response.

Measurement Results

Sample name	Amount of sample (g)	Titration volume (mL)	Salt content (%)	Average (%)	RSD (%)
Worcester Sauce	0.4115	5.7558	8.141	**8.145**	**0.0**
	0.4081	5.7112	8.145		
	0.4077	5.7072	8.147		
Medium thick sauce	0.4030	4.0627	5.863	**5.864**	**0.1**
	0.4054	4.0899	5.868		
	0.4070	4.1013	5.861		
Thick sauce	0.4158	3.6664	5.127	**5.124**	**0.1**
	0.4052	3.5685	5.120		
	0.4096	3.6099	5.124		

Sheet No.
GT-310-FO-001

Determination of salt content of sauces



Sample name	:	Worcester Sauce		
End point	:	5.7558 mL	257.83	mV
Start of titration	:	0 mL	91.880	mV
End of titration	:	6.4100 mL	364.52	mV
Measurement time	:	3 min 40 sec		

■ Parameters that are not listed below are the default values.

	Blank test	Sample titration
Detector	: mV	: mV
Titration mode	: General titration	: General titration
Initial wait time	: 10 s	: 10 s
Drop volume control	: Individual [Fine *1]	: Individual [Normal *1]
Max. drop volume	: 20 µL	: 300 µL
Min. drop volume	: 4 µL	: 10 µL
Stability criteria	: Individual [Fast *1]	: Individual [Fast *1]
Delta potential	: 2 mV	: 2 mV
Delta time	: 3 s	: 3 s
End point 1	: Inflection point	: Inflection point
E1 potential	: 350 mV	: 350 mV
E1 potential width	: 500 mV	: 500 mV
E1 derivative threshold	: 500 mV/mL	: 300 mV/mL
E1 evaluation points	: 1	: 6 *2
Max. titration volume	: 3 mL	: 20 mL

*1: It can also be used with parameters other than individual

*2: The default value is used.

*This application sheet is provided as reference, and does not assure the measurement results. Please consider analysis environment, external factors and sample nature for optimal conditions before the measurement.