Determination of Chloride/ Sodium Chloride in Food Samples

FOOD & BEVERAGE SERIES

Introduction

The application describes the potentiometric determination of chloride/sodium chloride ("salt") in food samples such as salt, spice mixtures, cheese, meat, dressings, or tomato sauce. This method excludes sample preparation of solid food samples that may need additional dissolving or emulsifying to accurately measure the concentration of chloride/sodium chloride ("salt") in the sample.

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a xylem brand

Apparatus
TL 5000 / TL 7000 / TL 7750 / 7800
TM 235 stirrer
20 mL exchangeable unit (WA 20). WA 50 would also be suitable.

Electrode, Cable, and Electrolyte
AgCl 62 (item # 285102100) **or** AgCl 62 RG (item # 285102100) are suitable electrodes. Note: AgCl 62 features liquid electrolyte, while AgCl 62 RG features gel and cannot be refilled.
L 1 A plug cable combination (item # 285122456).
2 mol/L KNO_3 electrolyte (item # 285138349) <u>if AgCl 62 is used.</u>

Solutions
Titration agent: Commercially prepared silver nitrate solution ($AgNO_3$) 0.1 mol/L
Solvent: Distilled water
Standard: NaCl titrimetric standard and HNO_3 1 mol/L

Procedure

Preparation of the silver nitrate solution
It is recommended the 0.1 mol/L silver nitrate solution ($AgNO_3$) be a commercially prepared solution.

Connect electrode

Connect the electrode to the TitroLine® 5000, TitroLine® 7000, TitroLine® 7750, or TitroLine® 7800. If using the AgCl 62 electrode, <u>open</u> the refilling hole during measurement or calibration.
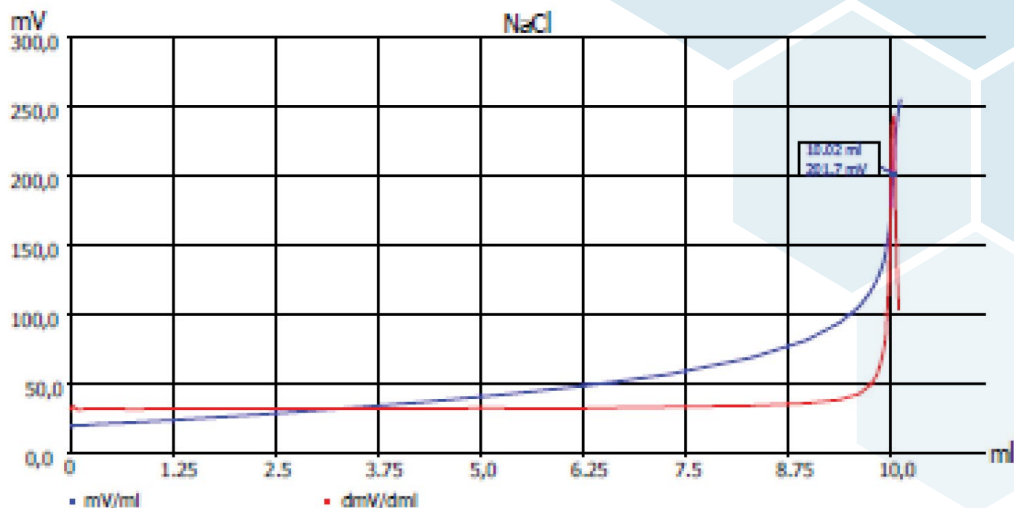
Standard titration

Weigh 70 to 90 mg of the NaCl standard and place in a 150 mL beaker. Add approximately 80 mL distilled water and 1 mL HNO_3 1 mol/L. Place the electrode and burette tip in the sample and start the method. The titration should stop at the equivalence point.

$$(W*F2) / ((EQ1-B)*M*F1)$$

W	weight of the NaCl standard in grams
F1	1
F2	1000; for the conversion from milligrams to grams
B	0; blank value

The result is the calculated as mol/L and can be automatically transferred to the exchangeable unit WA 20.

Method data	
Method name:	Titre AgNO$_3$
End date:	11.01.13
Titration data	
Start mV:	19.7 mV
EQ:	10.024 mL / 201.7 mV

Calculation formula	
Titre:	(W*F2)/((EQ1-B)*M*F1) -> WA
Titration duration:	3 m 4 s
End time:	18.27.02
Weight:	0.58660 g
End m/V:	2.55.4 mV
Titre:	0.1001 mol/l
Mol (M):	58.44000

Sample titration

Chemical Equation: $Ag^+ + Cl^- \longrightarrow AgCl \downarrow$

(EQ1-B)*T*M*F1/(W*F2)

EQ1	mL consumption at the equivalence point
B	0; blank value
T	exact concentration of the titrant in mol/L (c * factor) milligrams to grams
M	molecular/equivalent weight of NaCl or Cl
F1	0.1; conversion factor for % (*100/1000)
W	weight of the sample in grams
F2	1

The result is calculated as mol/L and can be automatically transferred to the exchangeable unit WA 20.

Weigh 0.05 to 10 grams of the sample according to the table below and add to a 150 mL glass beaker. Dilute the sample with distilled or deionized water up to 80 to 100 mL and add 1 mL of HNO$_3$ 1 mol/L (or similar). Place the electrode and burette tip in the sample, adjust the stirring speed, and press the "START" key.

Enter sample weight and sample ID, if prompted to do so. Then push OK or ENTER to execute the titration. The titration stops at the equivalence point. The result can be read from the display, printed if a printer is connected, and exported to a USB stick.

Table 1: Sample amount using 0.1 mol/L silver nitrate solution (AgNO$_3$)

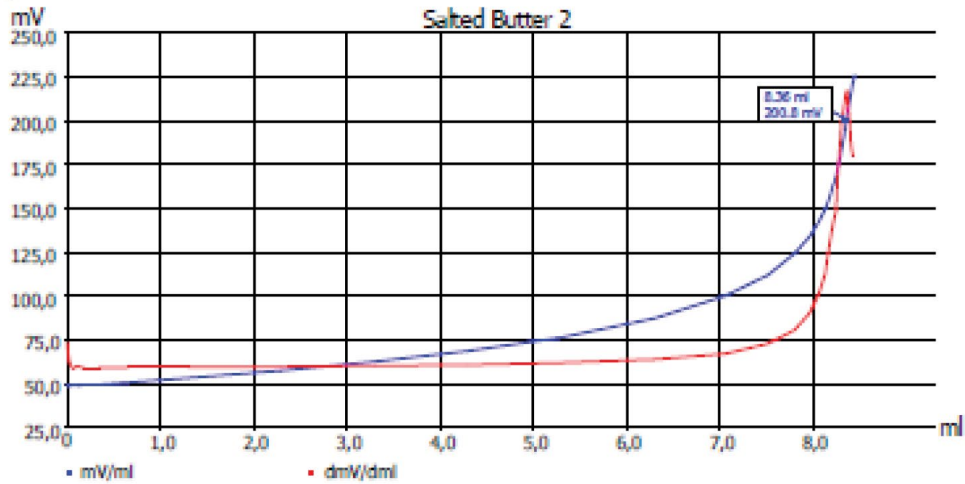| Salt content	Sample weight
< 0.1 %	> 10 g
0.1 - 1 %	1 - 10 g
1 - 10 %	0.1 - 2 g
10 - 50 %	0.05 - 0.1 g
50 - 100 %	0.05 g

Cheese samples, butter or other solid food products:
Weigh the sample in a 150 to 250 mL glass beaker and add 100 mL hot water (55 °C). For butter, boiling water is recommended. It is also recommended to use a homogenizer for better extraction of NaCl from the sample. Add 1 mL HNO$_3$. The warm/hot sample can be titrated directly.

Result Example

Titration graph

Salted Butter 2

Method data	
Method name:	Salt in %
End date:	07.03.13
Titration data	
Sample ID:	Salted Butter 2
Start mV:	49.7 mV
EQ:	8.361 mL / 200.8 mV

Calculation formula	
Salt:	(EQ1-B)*T*M*F1/(W*F2)
Blank value (B):	0.0000 mL
Factor 1 (F1):	0.1000
Factor 2 (F2):	1.0000
Titration duration:	2 m 10 s
End time:	16:46:19
Weight:	2.93600 g
End mV:	225.9 mV
Salt:	1.66%
Mol (M):	58.44300
Titre (T):	0.10000000 (a)
Weight (W):	2.93600 g (m)
Statistics:	Off

Method Information

Method data overall view

Method name:	Salt in %	Created at:	03/07/13 16:30:12
Method type:	Automatic titration	Last modification:	03/07/13 16:40:54
Measured value:	mV		
Titration mode:	Dynamic	Documentation	GLP
Dynamic:	Steep		
Measuring speed / drift	User-defined	Minimum holding time:	03 s
		Maximum holding time:	15 s
		Measuring time:	03 s
		Drift:	10 mV/min
Initial waiting time:	0 s		
Titration direction:	Increase		
Pretitration:	Off		
End Value:	Off		
EQ:	On		
Slope value:	User-defined	Value	200

Dosing parameter

Dosing speed:	100.00 %	Filling speed:	30 s
Maximum dosing volume:	50.00 mL		

Unit values

Unit size:	20 mL
Unit ID:	1296649042
Reagent:	AgNO3 0.1 mol/L
Batch ID:	Any Comment
Concentration [mol/l}:	0.10000
Determined at:	01/18/13 23:13:00
Expire date:	12/31/12
Opened/compounded:	08/19/11
Test according ISO 8655:	01/01/00
Last Modification:	02/15/13 9:54:17
Filling speed:	30 s

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