Technical Overview

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Agilent Model 123 Ion Selective Electrode Meter

Introduction

The model 123 ion selective electrode meter is designed for the determination of sodium, potassium, calcium, chloride, and pH in foods, beverages, and other feed and food products. The portable and robust build allows the flexibility of bringing the meter to the samples rather than bringing samples back to the lab. The simple-to-use interface and clear LCD readout allows for quick results with limited training requirements. Make testing quicker, easier, and portable with the Agilent 123 meter.

Protocol: Measuring calcium in juices and other liquids

This procedure is used to measure calcium in fruit juices and other liquids in batches of up to 15 samples for a single calibration and slope.

Meter setup

1. Place the meter on a flat surface, away from drafts and out of direct sunlight.
2. Connect the calcium reference electrode (clear plastic barrel) to the electrode jack for Channel 1.
3. Connect the calcium sensing electrode to the electrode BNC connector for Channel 1.
4. Slide the electrodes into the electrode holder and immerse in a sample cup of approximately 40 mL of 100 mg/100 mL calcium calibration standard.
5. Set the *Channel 1 CAL* switch on the back of the meter to 100.
6. Set the *Range* switch to 2000 for Channel 1.
7. Set the *Mode* knob for Channel 1 to Na/K/Ca^{2+}.

Let the electrodes soak for 12 hours in the standard solution.

Agilent Part Number	Material Description
123	Model 123 meter
51770	Calcium sensing electrode
51010-CA	Calcium reference electrode
82571-G	Calcium ready-to-use reagent
85700-G	Calcium calibration standard, 100 mg/100mL
85790-G	Calcium sloping standard, 10 mg/100mL
55777-Q	Calcium extracting solution

Sample preparation

Initial preparation

1. Homogenize a juice or liquid sample by mixing.
2. Measure 2.0 ±0.01 mL of sample into a flask.
3. For a known sample density, weigh out the equivalent of 2.0 mL and record the weight.

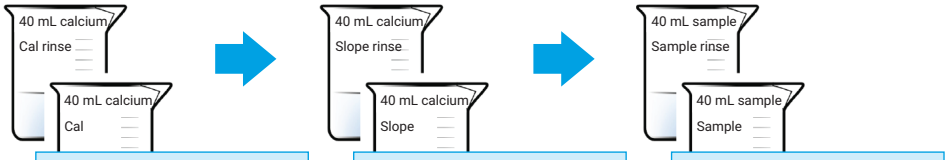
Extraction

1. Add 2.0 ±0.01 mL of the calcium extracting solution and swirl to mix.
2. Allow the sample to sit for 1 minute.
3. Record the exact sample weight.

Dilution

Add 100 ±0.5 mL of calcium ready-to-use reagent to the sample flask and stir to mix.

Sample analysis



Calibration (100 mg/100 mL)

- Measure 40 mL of calcium calibration standard into two beakers (1 × rinse, 1 × Cal).
- Immerse electrodes into the first beaker (rinse) and swirl.
- Immerse electrodes into the Cal beaker, wait 1 minute for stabilization.
- Dial the *Cal* knob on the meter to 100.

Slope (10 mg/100 mL)

- Measure 40 mL of calcium calibration standard into two beakers (1 × rinse, 1 × Slope).
- Immerse electrodes into the Slope beaker (rinse) and swirl.
- Immerse electrodes into the Cal beaker, wait 1 minute for stabilization.
- Set *Range* of the meter to 200.
- Dial the *Cal* knob on the meter to 10.0.

Sample

- Measure 40 mL of sample into two cups (1 × rinse, 1 × Sample).
- Immerse electrodes into the Sample beaker (rinse) and swirl.
- Immerse electrodes into the Cal beaker, wait 1 minute for stabilization.
- Record the meter reading.
- Meter reading = mg Ca/100 mL of juice.

Sample results

Sample	Volume (mL)	Meter Reading (mg/100 mL)
Fruit Punch	2.00	4
Apple Juice	2.00	2
Chicken Noodle Soup	2.00	7

Protocol: Measuring sodium in liquids and solids

This procedure is used to measure sodium in liquid batches of up to 15 samples for a single calibration and slope.

Meter setup

1. Place the meter on a flat surface, away from drafts and out of direct sunlight.
2. Connect the sodium reference electrode (clear plastic barrel) to the electrode jack for Channel 1.
3. Connect the sodium sensing electrode to the electrode BNC connector for Channel 1.
4. Slide the electrodes into the electrode holder and immerse in a sample cup of approximately 40 mL of 100 ppm sodium calibration standard.
5. Set the *Channel 1 CAL* switch on the back of the meter to 100.
6. Set the *Range* switch to 2000 for Channel 1.
7. Set the *Mode* knob for Channel 1 to Na/K/Ca^{2+}.

Let the electrodes soak for 12 hours in the standard solution.

Agilent Part Number	Material Description
123	Model 123 Meter
51023	Sodium sensing electrode
51010-NA	Sodium reference electrode
82506-G	Sodium ready-to-use reagent
82511-G	Sodium calibration standard 100 ppm
82510-G	Sodium sloping standard, 10 ppm

Sample preparation

Initial liquid preparation

1. Homogenize the juice or liquid sample by mixing.
2. Aliquot 2.0 ±0.01 mL of sample into a flask.
3. For a known sample density, weigh out the equivalent of 2.0 mL and record the weight.

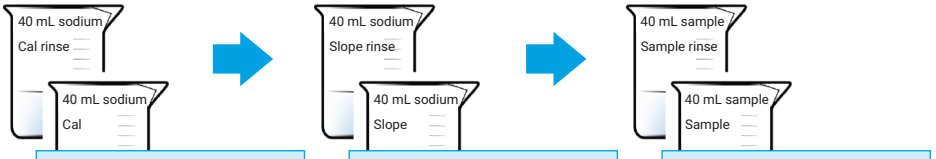
Initial solid preparation

1. Homogenize the solid sample with a blender or food processor.
2. Weigh out 1 to 2 g to the nearest 0.01 g of homogenized sample.
3. Record the exact sample weight.

Extraction and sample analysis

1. Add 100 ±0.01 mL of the sodium reagent and swirl to mix.
2. Allow the sample to sit for 1 minute.

Sample analysis



Calibration (100 mg/100 mL)

- Measure 40 mL of sodium calibration standard into two beakers (1 × rinse, 1 × Cal).
- Immerse electrodes into the first beaker (rinse) and swirl.
- Immerse electrodes into the Cal beaker, wait 1 minute for stabilization.
- Dial the *Cal* knob on the meter to 100.

Slope (100 mg/100 mL)

- Measure 40 mL of sodium calibration standard into two beakers (1 × rinse, 1 × Slope).
- Immerse electrodes into the Slope beaker (rinse) and swirl.
- Immerse electrodes into the Cal beaker, wait 1 minute for stabilization.
- Set *Range* of the meter to 200.
- Dial the *Cal* knob on the meter to 10.0.

Sample

- Measure 40 mL of sample into two cups (1 × rinse, 1 × Sample).
- Immerse electrodes into the Sample beaker (rinse) and swirl.
- Immerse electrodes into the Cal beaker, wait 1 minute for stabilization.
- Record the meter reading.
- %Na = (Meter reading/ sample weight) × 0.01

Sample results

Sample	Weight/Volume	Meter Reading	% Na
Peanut Butter	5.00 g	6.5	0.01
Fruit Punch	5.00 mL	2.5	Below cal.
Apple Juice	2.00 mL	6	0.03
Chicken Noodle Soup	2.00 mL	187	0.93

Protocol: Measuring chloride in liquids and solids

This procedure is used to measure chloride in liquid batches of up to 15 samples for a single calibration and slope.

Meter setup

1. Place the meter on a flat surface, away from drafts and out of direct sunlight.
2. Connect the chloride reference electrode (clear plastic barrel) to the electrode jack for Channel 1.
3. Connect the chloride sensing electrode to the electrode BNC connector for Channel 1.
4. Slide the electrodes into the electrode holder and immerse in a sample cup of approximately 40 mL of 10 mg/g chloride calibration standard.
5. Set the *Channel 1 CAL* switch on the back of the meter to 10.
6. Set the *Range* switch to 200 for Channel 1.
7. Set the *Mode* knob for Channel 1 to Cl^-.

Let the electrodes soak overnight in the standard solution.

Agilent Part Number	Material Description
123	Model 123 meter
51553	Chloride sensing electrode
51550	Chloride reference electrode
82551-G	Chloride ready-to-use reagent
82518-G	Chloride calibration standard 10 mg/g
82552-G	Chloride sloping standard, 3 mg/g

Sample preparation

Initial liquid preparation

1. Homogenize the juice or liquid sample by mixing.
2. Aliquot 2.0 ±0.01 mL of sample into a flask.
3. For a known sample density, weigh out the equivalent of 2.0 mL and record the weight.

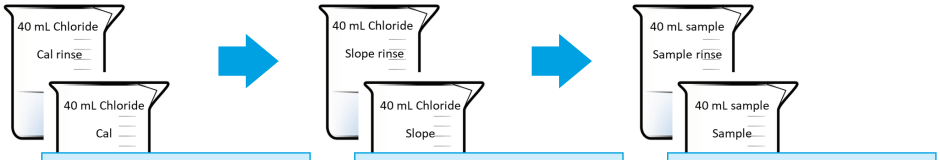
Initial solid preparation

1. Homogenize the solid sample with a blender or food processor.
2. Weigh out 1 to 2 g to the nearest 0.01 g of homogenized sample into a beaker.
3. Record the exact sample weight.

Extraction and sample analysis

1. Add 100 ±0.01 mL of the chloride reagent and swirl to mix.
2. Allow the sample to sit for 1 minute.
3. For readings higher than 10, dilute with distilled water.
4. For readings lower than 3, prepare the sample at 5.0 g or 5.0 mL

Sample analysis



Calibration (10.0 mg/g)

- Measure 40 mL of chloride calibration standard into two beakers (1 × rinse, 1 × Cal).
- Immerse electrodes into the first beaker (rinse) and swirl.
- Immerse electrodes into the Cal beaker, wait 1 minute for stabilization.
- Dial the *Cal* knob on the meter to 10.00.

Slope (3.00 mg/g)

- Measure 40 mL of chloride calibration standard into two beakers (1 × rinse, 1 × Slope).
- Immerse electrodes into the Slope beaker (rinse) and swirl.
- Immerse electrodes into the Cal beaker, wait 1 minute for stabilization.
- Dial the *Cal* knob on the meter to 3.0.

Sample

- Measure 40 mL of sample into two cups (1 × rinse, 1 × sample).
- Immerse electrodes into the Sample beaker (rinse) and swirl.
- Immerse electrodes into the Cal beaker, wait 1 minute for stabilization.
- Record the meter reading.
- meter reading divided by the sample weight = mg chloride/g

Sample results

Sample	Volume (mL)	Meter Reading (mg/g)
Fruit Punch	5.00	Below calibration
Apple Juice	5.00	Below calibration
Chicken Noodle Soup	2.00	27.3
	5x dilution with distilled water	5.5

123 Meter parts overview

Product Number	Description	Category
123	Model 123 ISE Meter	Lab-Ready Systems
123-NA	Sodium System	Lab-Ready Systems
123-CL	Chloride System	Lab-Ready Systems
123-K	Potassium System	Lab-Ready Systems
123-CA	Calcium System	Lab-Ready Systems
123-SALT	Salt System	Lab-Ready Systems
123-NA-D	Sodium System with Omnijet Dispenser	Lab-Ready Systems
123-CL-D	Chloride System with Omnijet Dispenser	Lab-Ready Systems
123-K-D	Potassium System with Omnijet Dispenser	Lab-Ready Systems
123-CA-D	Calcium System with Omnijet Dispenser	Lab-Ready Systems
123-SALT-D	Salt System with Omnijet Dispenser	Lab-Ready Systems
54000	Omnijet Dispenser	Accessories
51023	Sodium (Na+) Sensing Electrode	Electrodes
51010-NA	Sodium (Na+) Reference Electrode	Electrodes
51553	Chloride (Cl–) Sensing Electrode	Electrodes
51550	Chloride (Cl–) Reference Electrode	Electrodes
51333	Potassium (K+) Sensing Electrode	Electrodes
51010-K	Potassium (K+) Reference Electrode	Electrodes
51770	Calcium (Ca+) Sensing Electrode	Electrodes
51010-CA	Calcium (Ca+) Reference Electrode	Electrodes
51555	pH Electrode	Electrodes
82506-G	Sodium/Potassium Reagent RTU – 4 L	Sodium Solutions
82506-5G	Sodium/Potassium Reagent RTU – 20 L	Sodium Solutions
82511-Q	Sodium Standards 100 ppm – 1 L	Sodium Solutions
82511-G	Sodium Standards 100 ppm – 4 L	Sodium Solutions
82511-5G	Sodium Standards 100 ppm – 20 L	Sodium Solutions
82510-Q	Sodium Standards 10 ppm – 1 L	Sodium Solutions
82510-G	Sodium Standards 10 ppm – 4 L	Sodium Solutions
82510-5G	Sodium Standards 10 ppm – 20 L	Sodium Solutions
55555-G	Sodium Extracting Solution – 4 L	Sodium Solutions
55555-5G	Sodium Extracting Solution – 20 L	Sodium Solutions
82507-G	Sodium/Potassium Reagent Concentrate – 4 L	Sodium Solutions
82507-5G	Sodium/Potassium Reagent Concentrate – 20 L	Sodium Solutions
82531-Q	Potassium Standards (100 mg/100 mL)	Potassium Solutions
82532-Q	Potassium Standards (200 mg/100 mL) – 1 L	Potassium Solutions
82532-G	Potassium Standards (200 mg/100 mL) – 4 L	Potassium Solutions
82533-Q	Potassium Standards 50 ppm – 1 L	Potassium Solutions
82533-G	Potassium Standards 50 ppm – 4 L	Potassium Solutions
82555-Q	Potassium Standards 100 ppm – 1 L	Potassium Solutions
82555-G	Potassium Standards 100 ppm – 4 L	Potassium Solutions

Product Number	Description	Category
82557-Q	Salt Standard 1.00 wt% – 1 L	Salt Solutions
82557-G	Salt Standard 1.00 wt% – 4 L	Salt Solutions
82558-Q	Salt Standard 10.00 wt% – 1 L	Salt Solutions
82558-G	Salt Standard 10.00 wt% – 4 L	Salt Solutions
82551-G	Chloride Reagent RTU – 4 L	Chloride Solutions
82551-5G	Chloride Reagent RTU – 20 L	Chloride Solutions
82550-G	Chloride Reagent Concentrate – 4 L	Chloride Solutions
82550-5G	Chloride Reagent Concentrate – 20 L	Chloride Solutions
82518-Q	Chloride Standards (10 mg/g) – 1 L	Chloride Solutions
82518-G	Chloride Standards (10 mg/g) – 4 L	Chloride Solutions
82552-Q	Chloride Standards (3 mg/g) – 1 L	Chloride Solutions
82552-G	Chloride Standards (3 mg/g) – 4 L	Chloride Solutions
82571-G	Calcium Reagent RTU – 4 L	Calcium Solutions
82571-5G	Calcium Reagent RTU – 20 L	Calcium Solutions
82570-G	Calcium Reagent Concentrate – 4 L	Calcium Solutions
82570-5G	Calcium Reagent Concentrate – 20 L	Calcium Solutions
85700-Q	Calcium Standard (100 mg/100 mL) – 1 L	Calcium Solutions
85700-G	Calcium Standard (100 mg/100 mL) – 4 L	Calcium Solutions
85790-Q	Calcium Standard (10 mg/100 mL) – 1 L	Calcium Solutions
85790-G	Calcium Standard (10 mg/100 mL) – 4 L	Calcium Solutions
82533-Q	Calcium Standard 0.10 wt% – 1 L	Calcium Solutions
82573-G	Calcium Standard 0.10 wt% – 4 L	Calcium Solutions
82572-Q	Calcium Standard 1.00 wt% – 1 L	Calcium Solutions
82572-G	Calcium Standard 1.00 wt% – 4 L	Calcium Solutions
82575-Q	Calcium Standard 10.00 wt% – 1 L	Calcium Solutions
82575-G	Calcium Standard 10.00 wt% – 4 L	Calcium Solutions
82572-J-Q	Calcium Standard 1.00 wt% (Fruit Juices) – 1 L	Calcium Solutions
82572-J-G	Calcium Standard 1.00 wt% (Fruit Juices) – 4 L	Calcium Solutions
82575-J-Q	Calcium Standard 10.00 wt% (Fruit Juices) – 1 L	Calcium Solutions
82575-J-G	Calcium Standard 10.00 wt% (Fruit Juices) – 4 L	Calcium Solutions
55777-G	Calcium Extracting Solution – 4 L	Calcium Solutions
55777-5G	Calcium Extracting Solution – 20 L	Calcium Solutions
55400	Sodium Electrode Etchant Solution	Maintenance
55410	Sodium/Potassium Reference Fill Solution	Maintenance
55000-P	Potassium Electrode Regenerating Solution	Maintenance
53000-P	Calcium Electrode Regenerating Solution	Maintenance
56000-P	Calcium Reference Fill Solution	Maintenance
52000	Chloride Electrode Cleaning Compound	Maintenance
55415	Chloride Reference Fill Solution	Maintenance
55420	pH Electrode Fill Solution	Maintenance

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