



License ID 459712
Client ID 001-NBK-02361
User Metrohm

Program version viva 2.1 - 60
2020-07-08 11:32:46 UTC+2

Method parameters

Method Leveler determination (CVS, RC) auto 858
method 1
Method saving date 2020-07-08 07:15:26 UTC+2
Method version 1
Method group Main group
Method status original
Method saved by (full name) Metrohm International Headquarters
Method saved by (short name) Metrohm

START

Main track

General

Workplace view

Current view on

Track view for live window

Live display 1 Main track

Live display 2 Main track

Electrode check on

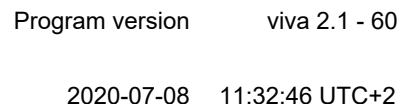
Application note

Sample data variables

| Name | Type | Assignment | Fixed value | Comment | Monitoring |
|--------------------|--------|--------------------|-------------|-------------------------|------------|
| ID1 | Text | ID1 | | Sample identification 1 | off |
| ID2 | Text | ID2 | | Sample identification 2 | off |
| ID3 | Text | ID3 | | Sample identification 3 | off |
| Sample type | Text | Sample type | | Sample type | off |
| Sample position | Number | Sample position | | Sample position number | off |
| Sample amount | Number | Sample amount | | Sample amount | off |
| Sample amount unit | Text | Sample amount unit | | Sample amount unit | off |

Name ID1
Type Text
Assignment on, ID1
Fixed value off.
Check at start on
Comment Sample identification 1

Name ID2
Type Text
Assignment on, ID2



Name Sample amount

AB 403: MVA-23 - Determination of leveler by RC without sample dilution

| Call text | Track name | Sample type | Condition |
|-----------|------------|-------------|-----------|
| Drain | Drain | off Sample | off |

| Call text | Track name | Sample type | Condition |
|--------------------|---------------|-------------|-----------|
| CALL PREP Standard | PREP Standard | on Standard | off |

| Call text | Track name | Sample type | Condition |
|----------------|------------------------|-------------|-----------|
| Add VMS | Electrolyte VMS | off Sample | off |
| Add suppressor | Electrolyte suppressor | off Sample | off |
| Add brightener | Electrolyte brightener | off Sample | off |

| | |
|---------------|--------------|
| Call text | Conditioning |
| Track name | VA track |
| Stop criteria | |



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Evaluation quantity on
Voltammetry command CVS
Substance Leveler
Standard deviation 2 %
Number of runs on
Number of runs 20
Action Cancel command
Run time off
Condition off

**CALL
ELECTROL
YTE**

CALL ELECTROLYTE

Call text Measure electrolyte
Track name VA track
Condition off

CALL

Sample or standard?

| Call text | Track name | Sample type | Condition |
|------------------|------------------|-------------|-----------|
| RC Determination | RC Determination | on Sample | off |
| RC Calibration | RC Calibration | on Standard | off |

CALL

CALL Final rinsing

| Call text | Track name | Sample type | Condition |
|---------------|---------------|-------------|-----------|
| Rinsing cycle | Rinsing cycle | off Sample | off |

TRACK

RC Determination

Return immediately off
Delete old data off

CALL

Empty measuring vessel

| Call text | Track name | Sample type | Condition |
|-----------|------------|-------------|-----------|
| Drain | Drain | off Sample | off |

**SET
TOTAL
VOLUME**

Reset volume

Volume 0.000 mL

CALL

Sample addition

| Call text | Track name | Sample type | Condition |
|--------------------------|--------------------------|-------------|-----------|
| Add sample automatically | Add sample automatically | off Sample | off |

CALL



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CALL

| Call text | Track name | Sample type | | Condition |
|-----------------------|------------------------|-------------|--------|-----------|
| Additional suppressor | Electrolyte suppressor | off | Sample | off |
| Additional brightener | Electrolyte brightener | off | Sample | off |

CALL VA

CALL SAMPLE

Call text Measure sample
Track name VA track
Condition off

CALL

CALL Rinse needle

| Call text | Track name | Sample type | | Condition |
|--------------|------------------------|-------------|--------|-----------|
| Rinse needle | Go to rinsing position | off | Sample | off |

TRACK

RC Calibration

Return immediately off
Delete old data off

LOOP

LOOP

Stop criteria

Max. run number on
Max. run number 5
Maximum run time off
Signal assessment for DT off
Condition off

ADD STD

ADD STD

Standard

Solution Standard or sample

Addition increments

Number 1
Addition volume 1 0.05 mL

Addition

Add manually off
Already added off
Add with dosing device on
Dosing rate 2.0 mL/min
Filling rate maximum mL/min

CALL VA

CALL STANDARD

Call text Measure standard
Track name VA track
Condition off



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CALL Clean DU standard

| Call text | Track name | Sample type | Condition |
|-------------------|-------------------|--------------|-----------|
| Clean DU standard | Clean DU standard | off Standard | off |

VA TRACK VA track

Return immediately off

CVS CVS

General/Hardware

Device

Device name not defined

Device type 884 Professional VA

Sensors/Electrodes

Working electrode RDE

Sensor type RDE/SSE

Reference electrode Reference electrode

Auxiliary electrode Auxiliary electrode

Electrode check on

Stirrer

Stirring rate 2500 min⁻¹

Hydrodynamic measurement on

Pretreatment

Stirring time 5.0 s

Cyclovoltammetric pretreatment

Start potential 0.2 V

Vertex potential 1.625 V

Sweep rate 1 V/s

Cycles off

Duration - s

Potentiostatic pretreatment

Potential 1 off V

Waiting time 1 0.0 s

Potential 2 off V

Waiting time 2 0.0 s

Potential 3 off V

Waiting time 3 0.0 s

Potential 4 off V

Waiting time 4 0.0 s

Potential 5 off V

Waiting time 5 0.0 s

Equilibration time 5.0 s

Sweep

Start potential 1.625 V

1st vertex potential -0.175 V



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2nd vertex potential 1.625 V
Potential step 0.006 V
Potential step time 0.060 s
Sweep rate 0.100 V/s
Preparation cycles 1
Measuring cycles 2
Sweep duration 109.08 s

Post-treatment

Cleaning

Cleaning potential off V
Cleaning time 0.0 s

Standby potential

Standby potential off V

Potentiostat

Current measuring range

Highest range 224 mA
Lowest range 20 µA

TRACK

PREP Standard

Return immediately off
Delete old data off

MOVE

Move to standard

Device

Device name not defined
Device type 858.0020 Professional Sample Processor

Target

Tower 1
Move Sample position

Beaker test

Display message on
Cancel determination off
Cancel determination and series off

Parameters

Shift rate 20 %/s
Shift direction auto
Swing rate 55 %/s

LIFT

Needle → Work position

Device

Device name not defined
Device type 858.0020 Professional Sample Processor

Target

Tower 1
Lift position Work position mm

Parameters

Lift rate 25 mm/s



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LOOP LOOP PREP Standard

Stop criteria

Max. run number on
Max. run number 2
Maximum run time off
Signal assessment for DT off
Condition off

PREP PREP Standard

Dosing device

Dosing unit 2 mL Standard or sample

CALL Rinsing cycle

| Call text | Track name | Sample type | Condition |
|---------------|---------------|-------------|-----------|
| Rinsing cycle | Rinsing cycle | off Sample | off |

CALL CALL Empty

| Call text | Track name | Sample type | Condition |
|------------------------|------------|-------------|-----------|
| Empty measuring vessel | Drain | off Sample | off |

TRACK Add sample automatically

Return immediately off
Delete old data off

CALL CALL Next sample

| Call text | Track name | Sample type | Condition |
|-------------|-------------|-------------|-----------|
| Next sample | Next sample | off Sample | off |

CALL Transfer sample

| Call text | Track name | Sample type | Condition |
|---------------------|------------------|-------------|-----------|
| Peristaltic pump ON | Peristaltic pump | off Sample | off |

ADD SAMPLE ADD SAMPLE

Addition

Add manually off
Already added on
Add with dosing device off

TRACK Go to rinsing position

Return immediately off
Delete old data off



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CALL Empty measuring vessel

| Call text | Track name | Sample type | Condition |
|-----------|------------|-------------|-----------|
| Drain | Drain | off Sample | off |

MOVE MOVE To rinsing position

Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Target
Tower 1
Move Rack position
Number = 'SD.Sample position' + 28
Beaker test
Display message on
Cancel determination off
Cancel determination and series off
Parameters
Shift rate 20 °/s
Shift direction auto
Swing rate 55 °/s

LIFT Needle → Work position

Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Target
Tower 1
Lift position Work position mm
Parameters
Lift rate 25 mm/s

CALL Transfer rinsing solution

| Call text | Track name | Sample type | Condition |
|---------------------|------------------|-------------|-----------|
| Peristaltic pump ON | Peristaltic pump | off Sample | off |

TRACK Clean DU standard

Return immediately off
Delete old data off

MOVE MOVE to rinsing position

Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Target



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Tower 1
Move Rack position
Number = 'SD.Sample position' + 28
Beaker test
Display message on
Cancel determination off
Cancel determination and series off
Parameters
Shift rate 20 °/s
Shift direction auto
Swing rate 55 °/s

LIFT Needle → work position

Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Target
Tower 1
Lift position Work position mm
Parameters
Lift rate 25 mm/s

PREP PREP with water

Dosing device
Dosing unit 2 mL Standard or sample

LIFT Needle → Shift position

Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Target
Tower 1
Lift position Shift position mm
Parameters
Lift rate 25 mm/s

PUMP Peristaltic pump 30 s

Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Pumps
Tower 1
Pump(s) Peristaltic
Rate 10
Action
Switch on off
Switch off off



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Duration on
Time 30 s

TRACK Next sample
Return immediately off
Delete old data off

MOVE MOVE To sample position
Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Target
Tower 1
Move Sample position
Beaker test
Display message on
Cancel determination off
Cancel determination and series off
Parameters
Shift rate 20 °/s
Shift direction auto
Swing rate 55 °/s

LIFT Needle → Work position
Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Target
Tower 1
Lift position Work position mm
Parameters
Lift rate 25 mm/s

TRACK Electrolyte VMS
Return immediately off
Delete old data off

ADD AUX ADD VMS
Auxiliary solution
Solution VMS
Volume 23.5 mL
Include volume in calculation on
Addition
Add manually off
Already added off
Add with dosing device on
Dosing rate maximum mL/min
Filling rate maximum mL/min



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TRACK Electrolyte suppressor

Return immediately off
Delete old data off

ADD AUX ADD Suppressor

Auxiliary solution

Solution Suppressor concentrate
Volume 0.5 mL
Include volume in calculation on

Addition

Add manually off
Already added off
Add with dosing device on
Dosing rate 2.0 mL/min
Filling rate maximum mL/min

TRACK Electrolyte brightener

Return immediately off
Delete old data off

ADD AUX ADD Brightener

Auxiliary solution

Solution Brightener concentrate
Volume 1 mL
Include volume in calculation on

Addition

Add manually off
Already added off
Add with dosing device on
Dosing rate 2.0 mL/min
Filling rate maximum mL/min

TRACK Rinsing cycle

Return immediately off
Delete old data off

LOOP LOOP Rinsing

Stop criteria

Max. run number on
Max. run number 2
Maximum run time off
Signal assessment for DT off
Condition off

CALL CALL Drain



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| Call text | Track name | Sample type | Condition |
|-----------|------------|-------------|-----------|
| Drain | Drain | off Sample | off |

CALL**CALL Rinse**

| Call text | Track name | Sample type | Condition |
|-----------|------------|-------------|-----------|
| Rinse | Rinse | off Sample | off |

TRACK**Peristaltic pump**

Return immediately off
Delete old data off

PUMP**Peristaltic pump ON**

Device

Device name not defined
Device type 858.0020 Professional Sample Processor

Pumps

Tower 1
Pump(s) Peristaltic
Rate 10

Action

Switch on off
Switch off off
Duration on
Time 300 s

TRACK**Rinse**

Return immediately off
Delete old data off

PUMP**PUMP Rinse**

Device

Device name not defined
Device type 858.0020 Professional Sample Processor

Pumps

Tower 1
Pump(s) 2

Action

Switch on off
Switch off off
Duration on
Time 9 s

TRACK**Drain**

Return immediately off
Delete old data off



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PUMP PUMP Drain
Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Pumps
Tower 1
Pump(s) 1
Action
Switch on off
Switch off off
Duration on
Time 35 s

SERIES START Series start track

RACK RACK INIT
Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Rack test on
Test rack 6.2041.450

EXIT Exit track

PUMP PUMPS OFF
Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Pumps
Tower 1
Pump(s) 1+2
Action
Switch on off
Switch off on
Duration off
Time 8.0 s

LIFT Needle → Shift position
Device
Device name not defined
Device type 858.0020 Professional Sample Processor
Target
Tower 1
Lift position Shift position mm
Parameters
Lift rate 25 mm/s



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LQH

FILL VMS

General/Hardware

Dosing device

Dosing unit 50 mL VMS

Parameters

Function Fill

Port 2

Rate maximum mL/min

LQH

FILL Suppressor

General/Hardware

Dosing device

Dosing unit 2 mL Suppressor

Parameters

Function Fill

Port 2

Rate maximum mL/min

LQH

FILL Brightener

General/Hardware

Dosing device

Dosing unit 2 mL Brightener

Parameters

Function Fill

Port 2

Rate maximum mL/min

ERROR

Error track

PUMP

PUMPS OFF

Device

Device name not defined

Device type 858.0020 Professional Sample Processor

Pumps

Tower 1

Pump(s) 1+2

Action

Switch on off

Switch off on

Duration off

Time 8.0 s

Evaluation parameters

General
CVS



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Data processing

Smoothing 1
Reversed peaks off

Curve evaluation

Fixed point evaluation off

Substances

CVS

Substances - Recognition

| Substance | Active | Characteristic potential | Tolerance | Min. width | Max. width | Min. measured quantity | Sweep direction |
|-----------|--------|--------------------------|-----------|------------|------------|------------------------|-----------------|
| Leveler | on | 0.1 V | 0.2 V | 0.01 V | 1 V | 200 pA | anodic |

CVS

Substances - Baseline

| Substance | Baseline type | Start base point | End base point |
|-----------|---------------|------------------|----------------|
| Leveler | Horizontal | 0.8 V | -0.05 V |

Standards

Standards

Name Standard or sample

Leveler 1000 mL/L

Calibration

General

Calibration method RC
Blank value correction with evaluation quantity off

CVS

Calibration curves

| Substance | Evaluation quantity | Curve type for standard | Weighting |
|-----------|---------------------|-------------------------|-----------|
| Leveler | Area | Linear interpolation | on |

Begin of evaluation standard

1.1

Results

Substance concentration in the sample

CVS



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| Substance | Decimal places | Assignment |
|-----------|----------------|------------|
| Leveler | 2 | RS01 |

Results

Additional results

| Result | Places | Prefix | Unit |
|--|--------|--------|------|
| Peak potential | 3 | | V |
| Height | 2 | # | A |
| RSD of the heights of all replications | 1 | | % |
| Area | 2 | # | C |
| RSD of the areas of all replications | 1 | | % |
| Start base point | 3 | | |
| End base point | 3 | | |
| Standardized area | 3 | | |
| Standardized height | 3 | | |
| Total volume | 3 | # | L |
| Zero-order coefficient | 3 | | |
| First-order coefficient | 3 | | |
| Second-order coefficient | 3 | | |
| Fourth-order coefficient | 3 | | |
| Coefficient of determination | 5 | | |
| Substance concentration in measuring vessel | 2 | # | |
| RSD of the substance concentration in measuring vessel | 1 | | % |
| Amount of substance | 2 | # | |
| RSD of the substance concentration in the sample | 1 | | % |
| Effective addition volume of the standard solution for the evaluation ratio | 2 | # | L |
| RSD of the effective addition volume of the standard solution for the evaluation ratio | 1 | | % |
| Calibration factor DT | 2 | # | |
| RSD of the calibration factor DT | 1 | | % |
| Effective addition volume of the sample solution for the evaluation ratio | 2 | # | L |
| RSD of the effective addition volume of the sample solution for the evaluation ratio | 1 | | % |

Database

Name database viva