



License ID 1955606
Client ID 001-NBK-02363
User Metrohm

Program version viva 3.0 - 69
2024-02-23 13:30:57 UTC+1

Method parameters

Method AB444 – MVA-24 - Leveler (CVS, RC) - with dilution
Method saving date 2024-02-23 13:30:48 UTC+1
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

In the field Prep cycles enter the number of preparation cycles to prepare the Dosing Unit «5 mL Standard or sample» with solution from the rack.

Sample data variables

Name	Type	Assignment	Fixed value	Comment	Monitoring
ID1	Text	ID1		Sample identification 1	off
ID2	Text	ID2		Sample identification 2	off
Prep cycles	Number	ID3		Number of preparation	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



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Fixed value off.
Check at start on
Comment Sample identification 2

Name **Sample type**
Type Text
Assignment on. Sample type
Fixed value off.
Check at start on
Comment Sample type

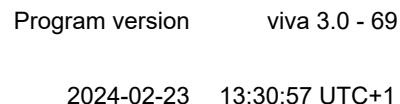
Name **Sample amount unit**
Type Text
Assignment on. Sample amount unit
Fixed value off.
Check at start on
Comment Sample amount unit

Name **Prep cycles**
Type Number
Assignment on. ID3
Fixed value off.
Check at start off
Comment Number of preparation cycles for dosing unit «5 mL
Standard or sample»

Variable monitoring off
Lower limit
Upper limit
Message
Display message on
Record message on
Message by e-mail off
E-mail template
Subject Message from viva - method 'Leveler determination (CVS, RC),
semiautomated1' - command 'Main track'

Acoustic signal off
Action off
Cancel determination on
Cancel determination and series off

Name **Sample position**
Type Number
Assignment on. Sample position
Fixed value off.
Check at start on
Comment Sample position number
Variable monitoring off



Name	Sample amount
Type	Number
Assignment	on. Sample amount
Fixed value	off.
Check at start	on
Comment	Sample amount
Variable monitoring	off
Lower limit	
Upper limit	
Message	
Display message	on
Record message	on
Message by e-mail	off
E-mail template	
Subject	Message from viva - method 'Leveler determination (CVS, RC), semiautomated1' - command 'Main track'
Acoustic signal	off
Action	off
Cancel determination	on
Cancel determination and series	off

AB-444/1: MVA-24 - Determination of leveler by CVS, RC with dilution of sample in electrolyte solution

Prep standard or sample

Run electrolyte



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Call text	Track name	Sample type		Condition
Run electrolyte	Electrolyte	off	Sample	off

CALL Sample or standard?

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

CALL Final rinsing

Call text	Track name	Sample type		Condition
Final rinsing	Rinsing	off	Sample	off

VA TRACK VA track

Return immediately off

CVS CVS

General/Hardware

Device

Device name 884_1
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



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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
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 μ A

TRACK

Electrolyte

Return immediately off
Delete old data off

CALL

Empty vessel electrolyte

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

STIR

Stirrer ON electrolyte

Device

Device name 884_1
Device type 884 Professional VA

Stirrer

Stirring rate 2500 min⁻¹

Action

Switch on on



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Switch off off
Duration off
Time 300 s

CALL Add electrolyte

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 Conditioning electrolyte

COND

Call text Conditioning electrolyte
Track name VA track
Stop criteria
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 Measure electrolyte

**ELECTROL
YTE**

Call text Measure electrolyte
Track name VA track
Condition off

TRACK RC Sample

Return immediately off
Delete old data off

STIR Stirrer ON sample

Device
Device name 884_1
Device type 884 Professional VA
Stirrer
Stirring rate 2500 min⁻¹
Action
Switch on on
Switch off off
Duration off
Time 300 s



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CALL Add sample

Call text	Track name	Sample type		Condition
Dose sample	Dose sample	off	Sample	off

CALL Add electrolyte sample

Call text	Track name	Sample type		Condition
Sample suppressor	Sample suppressor	off	Sample	off
Sample brightener	Sample brightener	off	Sample	off

CALL VA Measure sample

Call text Measure sample
Track name VA track
Condition off

TRACK RC Calibration

Return immediately off
Delete old data off

LOOP Variations

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

STIR Stirrer ON standard

Device
Device name 884_1
Device type 884 Professional VA
Stirrer
Stirring rate 2500 min⁻¹
Action
Switch on on
Switch off off
Duration off
Time 300 s

ADD STD Add standard RC

Standard
Solution Sample or standard
Addition increments
Number 1



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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 Measure standard

Call text Measure standard
Track name VA track
Condition off

CALL Prep DU with water

Call text	Track name	Sample type	Condition
Prep DU with water	Rinse DU	off Sample	off

TRACK Sample from rack

Return immediately off
Delete old data off

CALL Empty meas_vessel start

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

MOVE Move to sample position

Device
Device name 858 Sample Processor
Device type 858.0010 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 858 Sample Processor



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Device type 858.0010 Professional Sample Processor
Target
Tower 1
Lift position Work position mm
Parameters
Lift rate 25 mm/s

CALL Prepare DU

Call text	Track name	Sample type	Condition
Prepare 5mL DU	Prepare 5mL DU off	Sample	off

TRACK Prepare 5mL DU

Return immediately off
Delete old data off

LOOP No of preparation cycles

Stop criteria
Max. run number on
Max. run number = Case('Prep standard or sample.BSY' = 1
AND 'SD.Prep cycles' >= 1 ; 'SD.Prep
cycles' ; 1 ; 1)
Maximum run time off
Signal assessment for DT off
Condition off

PREP 5 mL Standard or sample

Dosing device
Dosing unit 5 mL Standard or sample

PUMP Draining ON

Device
Device name 858 Sample Processor
Device type 858.0010 Professional Sample Processor
Pumps
Tower 1
Pump(s) 1
Action
Switch on off
Switch off off
Duration on
Time 5 s

CALL Rinse measuring vessel



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Call text	Track name	Sample type	Condition
Rinse	Rinse	off Sample	off = 'No of preparation cycles.LCO' > 0

CALL Rinsing after DU prep

Call text	Track name	Sample type	Condition
Rinsing after DU prep	Rinsing	off Sample	off = 'No of preparation cycles.LCO' > 0

TRACK Rinse DU

Return immediately off
Delete old data off

CALL Empty vessel

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

MOVE Move to rinsing vial 28

Device
Device name 858 Sample Processor
Device type 858.0010 Professional Sample Processor
Target
Tower 1
Move Rack position
Number 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 Lift → Work position

Device
Device name 858 Sample Processor
Device type 858.0010 Professional Sample Processor
Target
Tower 1
Lift position Work position mm



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Parameters

Lift rate 25 mm/s

CALL Prepare with H2O

Call text	Track name	Sample type	Condition
Prepare 5mL DU	Prepare 5mL DU off	Sample	off

TRACK Dose sample

Return immediately off
Delete old data off

ADD SAMPLE Sample volume

Addition
Add manually off
Already added on
Add with dosing device off

LQH Dose to port 3
General/Hardware

Dosing device
Dosing unit 5 mL Standard or sample
Parameters
Function Dosing
Port 3
Volume = 'SD.Sample amount' * 1000 mL
Rate maximum mL/min

TRACK Electrolyte VMS

Return immediately off
Delete old data off

ADD AUX Add VMS 1

Auxiliary solution
Solution VMS 1
Volume 28.5 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

TRACK Electrolyte suppressor

Return immediately off
Delete old data off



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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 Sample suppressor

Return immediately off
Delete old data off

ADD AUX Add suppressor sample

Auxiliary solution

Solution Suppressor concentrate
Volume 0.25 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 Sample brightener

Return immediately off
Delete old data off



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ADD AUX Add brightener sample

Auxiliary solution

Solution Brightener 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 Rinsing

Return immediately off
Delete old data off

LOOP Rinsing cycles

Stop criteria

Max. run number on
Max. run number 1
Maximum run time off
Signal assessment for DT off
Condition off

STIR Stirrer ON

Device

Device name 884_1
Device type 884 Professional VA

Stirrer

Stirring rate 2500 min⁻¹

Action

Switch on on
Switch off off
Duration off
Time 300 s

CALL CALL Drain

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

Rinse



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TRACK Return immediately off

Delete old data off

PUMP Rinsing time

Device

Device name 858 Sample Processor

Device type 858.0010 Professional Sample Processor

Pumps

Tower 1

Pump(s) 2

Action

Switch on off

Switch off off

Duration on

Time 18 s

TRACK Drain

Return immediately off

Delete old data off

PUMP Draining time

Device

Device name 858 Sample Processor

Device type 858.0010 Professional Sample Processor

Pumps

Tower 1

Pump(s) 1

Action

Switch on off

Switch off off

Duration on

Time 50 s

TRACK DU VMS

Return immediately off

Delete old data off

LQH Fill 50 mL VMS 1

General/Hardware

Dosing device

Dosing unit 50 mL VMS 1

Parameters

Function Fill

Port 2

Rate maximum mL/min

DU Suppressor



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TRACK	Return immediately	off
	Delete old data	off
LQH	Fill 2 mL Suppressor	
	General/Hardware	
	Dosing device	
	Dosing unit	2 mL Suppressor
	Parameters	
	Function	Fill
	Port	2
	Rate	maximum mL/min
TRACK	DU Brightener	
	Return immediately	off
	Delete old data	off
LQH	Fill 2 mL Brightener	
	General/Hardware	
	Dosing device	
	Dosing unit	2 mL Brightener
	Parameters	
	Function	Fill
	Port	2
	Rate	maximum mL/min
TRACK	DU Standard or sample	
	Return immediately	off
	Delete old data	off
LQH	Fill 5 mL Standard/Sample	
	General/Hardware	
	Dosing device	
	Dosing unit	5 mL Standard or sample
	Parameters	
	Function	Fill
	Port	2
	Rate	maximum mL/min
TRACK	Shut OFF	
	Return immediately	off
	Delete old data	off
PUMP	Rinse Drain pumps OFF	
	Device	
	Device name	858 Sample Processor
	Device type	858.0010 Professional Sample Processor
	Pumps	
	Tower	1



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Pump(s) 1+2
Action
Switch on off
Switch off on
Duration off
Time 8.0 s

STIR

Stirrer OFF

Device
Device name 884_1
Device type 884 Professional VA
Stirrer
Stirring rate 2500 min⁻¹
Action
Switch on off
Switch off on
Duration off
Time 300 s

CALL

Condition shift needle

Call text	Track name	Sample type	Condition
Condition shift needle	Shift needle	off Sample	on = 'SD.Sample position' <> 'SD.NEXT.Sample position'

TRACK

Shift needle

Return immediately off
Delete old data off

LIFT

Needle → Shift position

Device
Device name 858 Sample Processor
Device type 858.0010 Professional Sample Processor
Target
Tower 1
Lift position Shift position mm
Parameters
Lift rate 25 mm/s

**SERIES
START**

Series start track

RACK

RACK INIT

Device
Device name 858 Sample Processor
Device type 858.0010 Professional Sample Processor



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Rack test on
Test rack 6.2041.450

SERIES
END **Series end track**

CALL **Rinse DU 5 mL Standard/Sa**

Call text	Track name	Sample type		Condition
Rinse DU	Rinse DU	off	Sample	off

CALL **Series end shut OFF**

Call text	Track name	Sample type		Condition
Shut OFF	Shut OFF	off	Sample	off

CALL **Series end shift needle**

Call text	Track name	Sample type		Condition
Shift needle	Shift needle	off	Sample	off

EXIT **Exit track**

CALL **Fill Dosing Units**

Call text	Track name	Sample type		Condition
Fill DU Standard or sample	DU Standard or sample	off	Sample	off
Fill DU VMS	DU VMS	off	Sample	off
Fill DU Suppressor	DU Suppressor	off	Sample	off
Fill DU Brightener	DU Brightener	off	Sample	off

CALL **Exit shut off**

Call text	Track name	Sample type		Condition
Exit shut off	Shut OFF	off	Sample	off

ERROR **Error track**

CALL **Error shut off**

Call text	Track name	Sample type		Condition
Error shut off	Shut OFF	off	Sample	off



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Evaluation parameters

General

CVS

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	0.3 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 Sample or standard

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



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Begin of evaluation
standard

1.1

Results

Substance concentration in the sample

CVS

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		%
Measured value	2	#	A
RSD of the measured values 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		
Standardized measured value	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



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Result	Places	Prefix	Unit
RSD of the effective addition volume of the sample solution for the evaluation ratio	1		%

Database

Name database viva