



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

Program version viva 2.1 - 60  
2020-07-08 11:35:18 UTC+2

## Method parameters

Method . . . . . Leveler determination (CVS, RC) auto 919  
method 1  
Method saving date . . . . . 2020-07-08 07:16:47 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

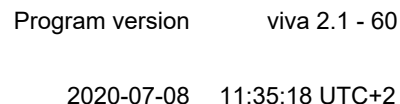
#### Application note

### 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 402: MVA-20 - 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<sup>-1</sup>

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 . . . . . 919.0020 IC Autosampler plus

**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 . . . . . 919.0020 IC Autosampler plus

**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 . . . . . 919.0020 IC Autosampler plus  
Target  
Tower . . . . . 1  
Move . . . . . Rack position  
Number . . . . . = 'SD.Sample position' + 14  
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 . . . . . 919.0020 IC Autosampler plus  
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 . . . . . 919.0020 IC Autosampler plus  
Target



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Tower . . . . . 1  
Move . . . . . Rack position  
Number . . . . . = 'SD.Sample position' + 14  
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 . . . . . 919.0020 IC Autosampler plus  
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 . . . . . 919.0020 IC Autosampler plus  
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 . . . . . 919.0020 IC Autosampler plus  
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 . . . . . 919.0020 IC Autosampler plus  
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 . . . . . 919.0020 IC Autosampler plus  
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 . . . . . 919.0020 IC Autosampler plus

## 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 . . . . . 919.0020 IC Autosampler plus

## 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 . . . . . 919.0020 IC Autosampler plus  
Pumps  
Tower . . . . . 1  
Pump(s) . . . . . 1  
Action  
Switch on . . . . . off  
Switch off . . . . . off  
Duration . . . . . on  
Time . . . . . 50 s

**SERIES START Series start track**

**RACK RACK INIT**  
Device  
Device name . . . . . not defined  
Device type . . . . . 919.0020 IC Autosampler plus  
Rack test . . . . . on  
Test rack . . . . . 6.2041.490

**EXIT Exit track**

**PUMP PUMPS OFF**  
Device  
Device name . . . . . not defined  
Device type . . . . . 919.0020 IC Autosampler plus  
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 . . . . . 919.0020 IC Autosampler plus  
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 . . . . . 919.0020 IC Autosampler plus  
Pumps  
Tower . . . . . 1  
Pump(s) . . . . . 1+2  
Action  
Switch on . . . . . off  
Switch off . . . . . on  
Duration . . . . . off  
Time . . . . . 8.0 s

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## 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