



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

Program version viva 2.1 - 60  
2020-07-08 11:29:44 UTC+2

## Method parameters

Method . . . . . Brightener determination (CVS, MLAT)  
automated 919  
Method saving date . . . . . 2020-07-08 07:38:50 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

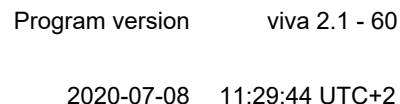
#### Application note

### 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 brightener by MLAT

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

Call text	Track name	Sample type		Condition
Add VMS	Intercept VMS	off	Sample	off
Add suppressor	Intercept suppressor	off	Sample	off

Call text	Conditioning in intercept solution
Track name	VA track
Stop criteria	
Evaluation quantity	on
Voltammetry command	CVS
Substance	Brightener
Standard deviation	2 %
Number of runs	on
Number of runs	20
Action	Cancel command



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Run time . . . . . off  
Condition . . . . . off

**CALL  
INTERCEPT**

**CALL INTERCEPT**

Call text . . . . . Measure intercept  
Track name . . . . . VA track  
Condition . . . . . off

**CALL**

**Sample addition**

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

**ADD AUX**

**ADD Suppressor**

Auxiliary solution

Solution . . . . . Suppressor concentrate  
Volume . . . . . 0.2 mL  
Include volume in calculation . . . . . on

Addition

Add manually . . . . . off  
Already added . . . . . off  
Add with dosing device . . . . . on  
Dosing rate . . . . . 2 mL/min  
Filling rate . . . . . maximum mL/min

**CALL VA**

**CALL SAMPLE**

Call text . . . . . Measure sample  
Track name . . . . . VA track  
Condition . . . . . off

**CALL**

**CALL Addition loop**

Call text	Track name	Sample type	Condition
Addition loop	Addition loop	off Sample	off

**CALL**

**CALL Rinse needle**

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

**CALL**

**CALL Final rinsing**

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



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## 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 . . . . . -0.3 V

2nd vertex potential . . . . . 1.625 V

Potential step . . . . . 0.006 V

Potential step time . . . . . 0.040 s

Sweep rate . . . . . 0.15 V/s

Preparation cycles . . . . . 1

Measuring cycles . . . . . 2



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Sweep duration . . . . . 77.76 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**

**Addition loop**

Return immediately . . . . . off

Delete old data . . . . . off

**LOOP**

**LOOP**

Stop criteria

Max. run number . . . . . on

Max. run number . . . . . 2

Maximum run time . . . . . off

Signal assessment for DT . . . . . off

Condition . . . . . off

**ADD STD**

**ADD STD**

Standard

Solution . . . . . Brightener concentrate

Addition increments

Number . . . . . 1

Addition volume 1 . . . . . 0.015 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 ADDITION**

Call text . . . . . Standard addition

Track name . . . . . VA track

Condition . . . . . off

**TRACK**

**Add sample automatically**

Return immediately . . . . . off

Delete old data . . . . . off

**CALL**

**CALL Next sample**



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	Call text	Track name	Sample type	Condition
	Next sample	Next sample	off Sample	off
<b>CALL</b>	<b>Transfer sample</b>			
	Call text	Track name	Sample type	Condition
	Peristaltic pump ON	Peristaltic pump	off Sample	off
<b>ADD SAMPLE</b>	<b>ADD Sample</b>			
	Addition			
	Add manually			off
	Already added			on
	Add with dosing device			off
<b>TRACK</b>	<b>Next sample</b>			
	Return immediately			off
	Delete old data			off
<b>MOVE</b>	<b>MOVE to sample position</b>			
	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
<b>LIFT</b>	<b>Needle → Work position</b>			
	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
<b>TRACK</b>	<b>Go to rinsing position</b>			
	Return immediately			off



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Delete old data . . . . . off

**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 Intercept VMS**

Return immediately . . . . . off

Delete old data . . . . . off

**ADD AUX ADD VMS intercept**

Auxiliary solution

Solution . . . . . VMS

Volume . . . . . 30 mL





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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 Intercept suppressor**

Return immediately . . . . . off

Delete old data . . . . . off

**ADD AUX ADD Suppressor intercept**

Auxiliary solution

Solution . . . . . Suppressor concentrate

Volume . . . . . 1.2 mL

Include volume in calculation . . . . . on

Addition

Add manually . . . . . off

Already added . . . . . off

Add with dosing device . . . . . on

Dosing rate . . . . . 2 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**

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

**Peristaltic pump**



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**TRACK** 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 . . . . . 300.0 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

**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



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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

**LQH**      **FILL VMS**

**General/Hardware**

Dosing device  
Dosing unit . . . . . 50 mL VMS

**Parameters**

Function . . . . . Fill  
Port . . . . . 2  
Rate . . . . . maximum mL/min



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**LQH FILL Brightener**  
**General/Hardware**  
Dosing device  
Dosing unit . . . . . 2 mL Brightener  
**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

**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

## Evaluation parameters

**General**  
**CVS**  
**Data processing**  
Smoothing . . . . . 1  
Reversed peaks . . . . . off  
**Curve evaluation**  
Fixed point evaluation . . . . . off  
**Substances**  
**CVS**  
**Substances - Recognition**



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Substance	Active	Characteristic potential	Tolerance	Min. width	Max. width	Min. measured quantity	Sweep direction
Brightener	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
Brightener	Horizontal	0.3 V	-0.05 V

#### Standards

##### Standards

Name Brightener concentrate

Brightener 1000 mL/L

#### Calibration

##### General

Calibration method . . . . . MLAT  
Blank value correction with evaluation . . . . . off  
quantity

#### CVS

##### Calibration curves

Substance	Evaluation quantity	Curve type	Weighting
Brightener	Area	Linear regression	on

#### Results

##### Substance concentration in the sample

##### CVS

Substance	Decimal places	Assignment
Brightener	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



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Result	Places	Prefix	Unit
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