



License ID 459712  
Client ID met0348  
User Metrohm

Program version viva 2.0 - 54  
2015-09-03 15:42:40 UTC+2

## Method parameters

Method . . . . . Template Cd and Pb by DP-ASV automated  
Method saving date . . . . . 2015-09-03 15:40:04 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 test . . . . . 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 amount	Number	Sample amount		Sample amount	off
Sample amount unit	Text	Sample amount unit		Sample amount unit	off
Sample position	Number	Sample position		Sample position	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  
Fixed value . . . . . off.



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Check at start . . . . . on  
Comment . . . . . Sample identification 2

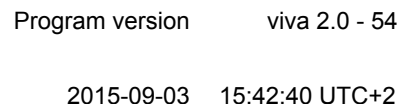
Name . . . . . **ID3**  
Type . . . . . Text  
Assignment . . . . . on. . . . . ID3  
Fixed value . . . . . off.  
Check at start . . . . . on  
Comment . . . . . Sample identification 3

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 . . . . . **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 'New method 3' - command 'Main track'  
Acoustic signal . . . . . off  
Action . . . . . off  
Cancel determination . . . . . on  
Cancel determination and series . . . . . off

Name . . . . . **Sample position**  
Type . . . . . Number



**CALL**      Empty measuring vessel

**CALL**      **Call sample**

**CALL**      **Call additions**

**CALL**      **CALL Rinse needle**

**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

## LOOP Replications

### Stop criteria

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

## DP ASV

### General/Hardware

#### Device

Device name . . . . . not defined  
Device type . . . . . 884 Professional VA

#### Sensors/Electrodes

Working electrode . . . . . MME  
Sensor type . . . . . MME  
Operating mode . . . . . HMDE  
Drop size . . . . . 4  
Reference electrode . . . . . Reference electrode  
Auxiliary electrode . . . . . Auxiliary electrode  
Electrode test . . . . . on

#### Stirrer

Stirring rate . . . . . 2000 min<sup>-1</sup>

### Pretreatment

Stirring time . . . . . 5.0 s

#### Cyclovoltammetric pretreatment

Start potential . . . . . -1.2 V  
Vertex potential . . . . . -0.100 V  
Sweep rate . . . . . 1 V/s  
Cycles . . . . . off  
Duration . . . . . - s

#### Potentiostatic pretreatment

Potential 1 . . . . . -0.9 V  
Waiting time 1 . . . . . 60.0 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



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### Sweep

Start potential . . . . . -0.8 V  
End potential . . . . . -0.2 V  
Potential step . . . . . 0.006 V  
Potential step time . . . . . 0.1 s  
Sweep rate . . . . . 0.060 V/s  
Pulse amplitude . . . . . 0.05 V  
Pulse time . . . . . 0.04 s  
Measuring time . . . . . 0.02 s  
Sweep duration . . . . . 10.00 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 . . . . . 2 mA  
Lowest range . . . . . 2  $\mu$ A  
Automatically select optimum current measuring range . . . . . on

### TRACK

#### Sample

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

### STIR & PURGE

#### During sample transfer

##### Device

Device name . . . . . not defined  
Device type . . . . . 884 Professional VA

##### Stir

Stirring rate . . . . . 2000 min<sup>-1</sup>  
Switch on . . . . . on  
Switch off . . . . . off  
Duration . . . . . off

##### Purge

Switch on . . . . . on  
Switch off . . . . . off  
Duration . . . . . off

#### Transfer sample



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## CALL

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

## ADD AUX

### Add electrolyte

#### Auxiliary solution

Solution . . . . . Electrolyte  
Volume . . . . . 1 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

## ELECTRODE TEST

### Device

Device name . . . . . not defined  
Device type . . . . . 884 Professional VA

### Sensors/Electrodes

Working electrode . . . . . MME  
Sensor type . . . . . MME

### Stirrer

Stirring rate . . . . . 2000 min<sup>-1</sup>

## STIR & PURGE

### Initial purge

#### Device

Device name . . . . . not defined  
Device type . . . . . 884 Professional VA

#### Stir

Stirring rate . . . . . 2000 min<sup>-1</sup>  
Switch on . . . . . on  
Switch off . . . . . off  
Duration . . . . . off

#### Purge

Switch on . . . . . off  
Switch off . . . . . off  
Duration . . . . . on



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Time . . . . . 180 s

**CALL VA Measure sample**

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

**TRACK Standard addition**

Return immediately . . . . . off  
Delete old data . . . . . off

**LOOP Variations**

Stop criteria

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

**ADD STD Add standard**

Standard

Solution . . . . . Standard

Addition increments

Number . . . . . 1  
Addition volume 1 . . . . . 0.100 mL

Addition

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

**STIR & PURGE Addition purge**

Device

Device name . . . . . not defined  
Device type . . . . . 884 Professional VA

Stir

Stirring rate . . . . . 2000 min<sup>-1</sup>  
Switch on . . . . . on  
Switch off . . . . . off  
Duration . . . . . off

Purge

Switch on . . . . . off  
Switch off . . . . . off  
Duration . . . . . on  
Time . . . . . 30 s

**Measure additions**



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**CALL VA** Call text . . . . . Measure additions  
Track name . . . . . VA track

Condition . . . . . off

**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** **Go to rinsing position**  
Return immediately . . . . . off  
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





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Device type . . . . . 919.0020 IC Autosampler plus  
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 . . . . . 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 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 Rinse**



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## CALL

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 . . . . . 180 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 . . . . . 8 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



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#### Pumps

Tower . . . . . 1  
Pump(s) . . . . . 1

#### Action

Switch on . . . . . off  
Switch off . . . . . off  
Duration . . . . . on  
Time . . . . . 18 s

#### TRACK

##### Shut off

Return immediately . . . . . off  
Delete old data . . . . . off

#### 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

#### STIR & PURGE

##### STIR & PURGE OFF

#### Device

Device name . . . . . not defined  
Device type . . . . . 884 Professional VA

#### Stir

Stirring rate . . . . . 2000 min<sup>-1</sup>  
Switch on . . . . . off  
Switch off . . . . . on  
Duration . . . . . off

#### Purge

Switch on . . . . . off



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Switch off . . . . . on  
Duration . . . . . off

**MAIN  
VALVE**

**N2 OFF**

**Device**

Device name . . . . . not defined  
Device type . . . . . 884 Professional VA

**Action**

Open . . . . . off  
Close . . . . . on

**TRACK**

**DU Standard**

Return immediately . . . . . off  
Delete old data . . . . . off

**LQH**

**Fill DU Standard**

**General/Hardware**

**Dosing device**

Dosing unit . . . . . 2 mL Standard

**Parameters**

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

**TRACK**

**DU Electrolyte**

Return immediately . . . . . off  
Delete old data . . . . . off

**LQH**

**Fill DU Electrolyte**

**General/Hardware**

**Dosing device**

Dosing unit . . . . . 5 mL Electrolyte

**Parameters**

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

**SERIES  
START**

**Series start track**

**RACK**

**Initialize rack**

**Device**

Device name . . . . . not defined  
Device type . . . . . 919.0020 IC Autosampler plus

Rack test . . . . . on

Test rack . . . . . 6.2041.510

**EXIT**

**Exit track**



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**CALL Exit shut off**

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

**CALL Fill Dosing Units**

Call text	Track name	Sample type	Condition
Fill DU Standard	DU Standard	off Sample	off
Fill DU Electrolyte	DU Electrolyte	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

**Evaluation parameters**

**General**

**ASV**

**Data processing**

Smoothing . . . . . 1  
Reversed peaks . . . . . off

**Curve evaluation**

Fixed point evaluation . . . . . off

**Substances**

**ASV**

**Substances - Recognition**

Substance	Active	Characteristic potential	Tolerance	Min. width	Max. width	Min. measured quantity
Cd	on	-0.58 V	0.05 V	0.01 V	0.5 V	200 pA
Pb	on	-0.38 V	0.05 V	0.01 V	0.5 V	200 pA

**ASV**

**Substances - Baseline**

Substance	Baseline type	Start base point	End base point
Cd	Linear	Automatically	Automatically
Pb	Linear	Automatically	Automatically

**Standards**



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## Standards

Name	Standard
------	----------

Cd	0.1 mg/L
----	----------

Pb	1.0 mg/L
----	----------

## Calibration

### General

Calibration method . . . . . Standard addition

Blank value correction with evaluation . . . . . off  
quantity

### ASV

#### Calibration curves

Substance	Evaluation quantity	Curve type	Weighting
Cd	Height	Linear regression	on
Pb	Height	Linear regression	on

## Results

### Substance concentration in the sample

#### ASV

Substance	Decimal places	Assignment
Cd	2	RS01
Pb	2	RS02

## 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		



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Result	Places	Prefix	Unit
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