



License ID 459712
Client ID met0739
User Metrohm

Program version viva 1.1 - 37
2014-05-19 15:20:44 UTC+2

Method parameters

Method AB 420 smartDT
Method saving date 2014-05-15 15:16:58 UTC+2
Method version 1
Method group %Examples
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

smartDT (dilution titration with intelligent addition volumes) For more details see Application Bulletin 420. Comments - Recommended value «Initial volume in mL»: 25% of the total addition volume at evaluation ratio in the calibration (range 0.01 ... 1 mL) - Recommended value «Minimum volume in mL»: 5% ... 7% of the total addition volume at evaluation ratio in the calibration (range 0.01 ... 0.1 mL) Method sequence Track Main track START command contains additional sample data «Initial volume in mL» (ID4; type: number) and «Minimum volume in mL» (ID5; type: number). Volumes (in mL) have to be defined on the Workplace and are used as variables in the in the commands ADD STD and ADD SAMPLE DT. Track DT Determination ADD SAMPLE DT (SAMPLE fix volume) addition of volume as defined for «Initial volume in mL» WAIT (DOC sample fix volume) output of the volume «SAMPLE fix volume» in the message subwindow ADD SAMPLE DT (SAMPLE smartDT) addition volume calculated based on «Minimum volume in mL» and the predicted volume at the evaluation ratio WAIT (DOC volume smartDT sample) output of the calculated addition volumes «SAMPLE smartDT» in the message subwindow Track DT Calibration ADD STD (STD fix volume) addition of volume as defined for «Initial volume in mL» WAIT (DOC standard fix volume) output of the volume «STD fix volume» in the message subwindow ADD STD (STANDARD smartDT) addition volume calculated based on «Minimum volume in mL» and the predicted volume at the evaluation ratio WAIT (DOC volume smartDT calib) output of the calculated addition volumes «STANDARD smartDT» in the message subwindow

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



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Name	Type	Assignment	Fixed value	Comment	Monitoring
Initial volume in mL	Number	ID4			on
Minimum volume in	Number	ID5			on

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.
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 position**
Type Number
Assignment on. Sample position
Fixed value off.
Check at start on
Comment Sample position number
Variable monitoring off
Lower limit
Upper limit
Message
Display message on
Record message on
Message by e-mail off



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E-mail template
Subject Message from viva - method 'Suppressor determination (CVS, DT), semiautomate' - command 'Main track'

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

Name **Initial volume in mL**
Type Number
Assignment on. ID4
Fixed value off.
Check at start on
Comment
Variable monitoring on
Lower limit 0.01
Upper limit 1
Message The volume specified for «Initial volume in mL» is smaller than 0.01 mL or bigger than 1 mL. Please change the entry on the «Workplace» and restart the determination.

Display message on
Record message on
Message by e-mail off
E-mail template
Subject Message from viva - method 'New method 2' - command 'Main track'

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

Name **Minimum volume in mL**
Type Number
Assignment on. ID5
Fixed value off.
Check at start on
Comment
Variable monitoring on
Lower limit 0.01
Upper limit 0.1
Message The volume specified for «Minimum volume in mL» is smaller than 0.01 mL or bigger than 0.1 mL. Please change the entry on the «Workplace» and restart the determination.

Display message on
Record message on



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Message by e-mail off
E-mail template
Subject Message from viva - method 'New method 2' - command 'Main track'

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

Command comment

AB 420: smartDT - Determination of suppressor by DT with intelligent addition volumes

CALL

Add VMS

Call text	Track name	Sample type	Condition
Add VMS	ADD VMS	off Sample	off

**CALL
COND**

CALL COND

Call text Conditioning in VMS
Track name VA track
Stop criteria
Evaluation quantity on
VA measuring command CVS
Substance Suppressor
Standard deviation 0.5 %
Number of runs on
Number of runs 20
Action Cancel command
Run time off
Condition off

CALL VMS

CALL VMS

Call text Measure VMS
Track name VA track
Condition off

CALL

Sample or standard?

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

VA TRACK

VA track

Return immediately off

CVS

CVS

General/Hardware



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Device

Device name 894_1
Device type 894 Professional CVS
Working electrode RDE
Sensor type RDE
Reference electrode Reference electrode
Auxiliary electrode Auxiliary electrode
Electrode test on

Stirrer

Stirring rate 2500 min⁻¹
Hydrodynamic measurement on

Pretreatment

Stirring time 5.0 s
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
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

Maximum range 224 mA
Minimum range 20 µA

TRACK

DT Determination

Return immediately off
Delete old data off

SAMPLE fix volume



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**ADD
SAMPLE
DT**

Addition increments

Number 1

Addition volume 1 = 'SD.Initial volume in mL' mL

Addition

Add manually off

Add with dosing device on

Dosing unit 894/D4 2mL Std or sample

Dosing rate 2.0 mL/min

Filling rate maximum mL/min

WAIT

DOC sample fix volume

Wait

Stop track and waiting for [Continue] off

Stop all tracks and waiting for [Continue] off

Waiting time on

Time 0

Unit s

Message

Addition volume 1: [= 'SAMPLE fix volume.
VOL' * 1000] mL

Record message on

Message by e-mail off

Acoustic signal off

CALL VA

CALL SAMPLE fix volume

Call text Measure sample

Track name VA track

Condition off

LOOP

Sample addition

Stop criteria

Max. run number off

Maximum run time off

Signal assessment for DT on

VA measuring command CVS

Substance Suppressor

Signal ratio Q/Q(0) = 'ED.Calibration.CVS.Suppressor.EVRATIO'
- 0.01

Condition off

**ADD
SAMPLE
DT**

SAMPLE smartDT

Addition increments

Number 1

Addition volume 1 mL



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```
... = 'SD.Minimum volume in mL' + ( Case(  
  Abs( 'RS.CVS.Suppressor.VEFFSMPL' *  
  1000 ) <= 'SD.Initial volume in mL' * 7 ; Abs  
( 'RS.CVS.Suppressor.VEFFSMPL' * 1000 )  
  ; 'SD.Initial volume in mL' * 7 ; 'SD.Initial  
  volume in mL' * 7 ) * ( ( Abs( 'RS.CVS.  
  Suppressor.VAR{ Round( 'SAMPLE fix  
  volume.ACO' + 'SAMPLE smartDT.ACO' - 1  
  )}.REP{1}.AREANORM' - 'ED.Calibration.  
  CVS.Suppressor.EVRATIO' ) ) / 5 ) )
```

Addition

Add manually off
Add with dosing device on
Dosing unit 894/D4 2mL Std or sample
Dosing rate 2.0 mL/min
Filling rate maximum mL/min

WAIT DOC volume smartDT sample

Wait

Stop track and waiting for [Continue] off
Stop all tracks and waiting for [Continue] off
Waiting time on
Time 0
Unit s

Message

Addition volume [= Round('Sample addition.
LCO' + 1)]: [= Round('SAMPLE smartDT.
VOL' * 1000 * 1000) / 1000] mL

Record message on
Message by e-mail off
Acoustic signal off

CALL VA CALL SAMPLE

Call text Measure sample
Track name VA track
Condition off

TRACK DT Calibration

Return immediately off
Delete old data off

ADD STD STD fix volume

Standard

Solution Std or sample

Addition increments

Number 1
Addition volume 1 = 'SD.Initial volume in mL' mL

Addition

Add manually off
Already added off
Add with dosing device on



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Dosing rate 2.0 mL/min

Filling rate maximum mL/min

WAIT DOC standard fix volume

Wait

Stop track and waiting for [Continue] off

Stop all tracks and waiting for [Continue] off

Waiting time on

Time 0

Unit s

Message Addition volume 1: [= 'STD fix volume.VOL' *
1000] mL

Record message on

Message by e-mail off

Acoustic signal off

CALL VA CALL STD fix volume

Call text Measure standard

Track name VA track

Condition off

LOOP Standard addition

Stop criteria

Max. run number off

Maximum run time off

Signal assessment for DT on

VA measuring command CVS

Substance Suppressor

Signal ratio Q/Q(0) = 'ED.Calibration.CVS.Suppressor.EVRATIO' -
0.01

Condition off

ADD STD STANDARD smartDT

Standard

Solution Std or sample

Addition increments

Number 1

Addition volume 1 = 'SD.Minimum volume in mL' + (Case(mL
Abs('RS.CVS.Suppressor.VEFFSTD' * 1000
) <= 'SD.Initial volume in mL' * 7 ; Abs(
'RS.CVS.Suppressor.VEFFSTD' * 1000) ;
'SD.Initial volume in mL' * 7 ; 'SD.Initial
volume in mL' * 7) * ((Abs('RS.CVS.
Suppressor.VAR{ Round('STD fix volume.
ACO' + 'STANDARD smartDT.ACO' - 1) } .
REP{1}.AREANORM' - 'ED.Calibration.CVS.
Suppressor.EVRATIO')) / 5))

Addition

Add manually off

Already added off



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Add with dosing device on
Dosing rate 2.0 mL/min
Filling rate maximum mL/min

WAIT DOC volume smartDT calib

Wait

Stop track and waiting for [Continue] off
Stop all tracks and waiting for [Continue] off
Waiting time on
Time 0
Unit s

Message Addition volume [= Round('Standard addition.
LCO' + 1)]: [= Round('STANDARD smartDT.
VOL' * 1000 * 1000) / 1000] mL

Record message on
Message by e-mail off
Acoustic signal off

CALL VA CALL STANDARD

Call text Measure standard
Track name VA track
Condition off

TRACK ADD VMS

Return immediately off
Delete old data off

ADD AUX ADD VMS

Auxiliary solution

Solution VMS
Volume 50 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

EXIT Exit track

LQH FILL 894/D1

General/Hardware

Device

Device name 894_1
Device type 894 Professional CVS

Dosing device

Dosing device 1



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Name of dosing unit 894/D1 50mL VMS

Parameters

Function Fill
Port 2
Rate maximum mL/min

LQH

FILL 894/D4

General/Hardware

Device

Device name 894_1
Device type 894 Professional CVS

Dosing device

Dosing device 4
Name of dosing unit 894/D4 2mL Std or sample

Parameters

Function Fill
Port 2
Rate maximum mL/min

Evaluation parameters

General

CVS

Data processing

Smoothing 1
Reversed peaks off

Curve evaluation

Fixed point evaluation off

Standards

Standards

Name Std or sample

Suppressor 5 mL/L

Calibration

General

Calibration method DT

CVS

Calibration curves

Substance	Evaluation quantity	Curve type for standard	Weighting
Suppressor	Area	Linear interpolation	on



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Begin of evaluation standard	Curve type for sample	Begin of evaluation sample	Evaluation ratio
1.1	Linear interpolation	1.1	0.5

Results

Substance concentration in the sample

CVS

Substance	Decimal places	Assignment
Suppressor	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