



License ID 4570896  
Client ID 001-srv-mnet06  
User Metrohm

Program version viva 3.0 - 69  
2025-03-14 10:41:22 UTC+1

## Method parameters

Method . . . . . AB 440 Determination of Ni and Co on Bi drop  
Method saving date . . . . . 2025-03-14 10:30:00 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 . . . . . off

#### Application note

Measuring solution: 10 mL sample 1 mL supporting electrolyte 0.1 mL DMG-solution

#### 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

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



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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

**Command comment**

AB 440/1: Determination of nickel and cobalt at Bi drop electrode

**CALL**      **Call sample**



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

#### CALL

##### Call additions

Call text	Track name	Sample type	Condition
Call additions	Standard addition	off Sample	off

#### 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

#### SQW

##### SQW

###### 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 . . . . . off

###### Stirrer

Stirring rate . . . . . 2000 min<sup>-1</sup>  
Hydrodynamic measurement . . . . . off

###### Pretreatment

Stirring time . . . . . 5 s

###### Cyclovoltammetric pretreatment

Start potential . . . . . 0.1 V  
Vertex potential . . . . . -0.2 V  
Sweep rate . . . . . 1 V/s  
Cycles . . . . . 2  
Duration . . . . . 1.20 s

###### Potentiostatic pretreatment

Potential 1 . . . . . -1.3 V  
Waiting time 1 . . . . . 10 s  
Potential 2 . . . . . -0.8 V



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Waiting time 2 . . . . . 30 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 . . . . . -0.8 V  
End potential . . . . . -1.3 V  
Potential step . . . . . 0.006 V  
Frequency . . . . . 25 Hz  
Potential step time . . . . . 0.040 s  
Sweep rate . . . . . 0.150 V/s  
Pulse amplitude . . . . . 0.02 V  
Sweep duration . . . . . 3.33 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 . . . . . 200 µA  
Automatically select optimum current measuring range . . . . . on

**TRACK**

**Sample**

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

**ADD  
SAMPLE**

**Add sample**

**Addition**

Add manually . . . . . on  
Display standard message . . . . . on  
Display message defined by the user . . . . . off  
Already added . . . . . off  
Add with dosing device . . . . . off

**ADD AUX**

**Add electrolyte**

**Auxiliary solution**

Solution . . . . . Electrolyte  
Volume . . . . . 1 mL  
Include volume in calculation . . . . . on

**Addition**



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Add manually . . . . . on  
Display standard message . . . . . on  
Display message defined by the user . . . . . off  
Already added . . . . . off  
Add with dosing device . . . . . off

**ADD AUX    ADD DMG**

Auxiliary solution

Solution . . . . . DMG solution  
Volume . . . . . 0.1 mL  
Include volume in calculation . . . . . on

Addition

Add manually . . . . . on  
Display standard message . . . . . on  
Display message defined by the user . . . . . off  
Already added . . . . . off  
Add with dosing device . . . . . off

**STIR &  
PURGE**

**Initial purge**

Device

Device name . . . . . 884\_1  
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 . . . . . 300 s

**CALL  
COND**

**Conditioning in sample**

Call text . . . . . Conditioning in sample  
Track name . . . . . VA track  
Stop criteria  
Evaluation quantity . . . . . off  
Number of runs . . . . . on  
Number of runs . . . . . 1  
Action . . . . . Cancel command  
Run time . . . . . off  
Condition . . . . . off

**CALL VA**

**Measure sample**

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



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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 . . . . . 0.05 mL

Addition

Add manually . . . . . on

Display standard message . . . . . on

Display message defined by the user . . . . . off

Already added . . . . . off

Add with dosing device . . . . . off

**STIR & PURGE Addition purge**

Device

Device name . . . . . 884\_1

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 . . . . . 5 s

**CALL VA Measure additions**

Call text . . . . . Measure additions

Track name . . . . . VA track

Condition . . . . . off

**Shut off**



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**TRACK** Return immediately . . . . . off

Delete old data . . . . . off

**STIR & PURGE** **Stir & purge OFF**

Device

Device name . . . . . 884\_1

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

Switch off . . . . . on

Duration . . . . . off

**MAIN VALVE** **N2 OFF**

Device

Device name . . . . . 884\_1

Device type . . . . . 884 Professional VA

Action

Open . . . . . off

Close . . . . . on

**EXIT** **Exit track**

**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

**Evaluation parameters**

**General**

**SQW**

**Data processing**



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

#### Curve evaluation

Fixed point evaluation . . . . . off

### Substances

#### SQW

##### Substances - Recognition

Substance	Active	Characteristic potential	Tolerance	Min. width	Max. width	Min. measured quantity
Ni	on	-1 V	0.05 V	0.01 V	0.5 V	200 pA
Co	on	-1.15 V	0.05 V	0.01 V	0.5 V	200 pA

#### SQW

##### Substances - Baseline

Substance	Baseline type	Start base point	End base point
Ni	Linear	Automatically	Automatically
Co	Linear	Automatically	Automatically

### Standards

#### Standards

Name Standard

Ni 0.1 mg/L  
Co 0.1 mg/L

### Calibration

#### General

Calibration method . . . . . Standard addition  
Blank value correction with evaluation . . . . . off  
quantity

#### SQW

##### Calibration curves

Substance	Evaluation quantity	Curve type	Weighting
Ni	Height	Linear regression	on
Co	Height	Linear regression	on

### Results

#### Substance concentration in the sample

#### SQW





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Substance	Decimal places	Assignment
Ni	2	RS01
Co	2	RS02

## Results

### Additional results

Result	Places	Prefix	Unit
Peak potential	3		V
Height	3	μ	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	μ	
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