Determination of free Chlorine and total Chlorine in Water and Wastewater

Application

Use

This method is used for the quantitative determination of Chlorine, Hypochlorite and Chloramine in water and wastewater using the potentiometric or Dead Stop titration method with phenylarisine oxide as titrant. The method is used for chlorine concentrations < 5 mg/L. The endpoint can be detected potentiometric using a combined platinum electrode (recommended) or amperometric using a double platinum electrode.

Appliances

- Titrator: TL 7000
- Basic device
- Magnetic stirrer TM 235
- 10 or 5 mL Exchange unit WA 10/WA 5, with amber glass bottle for the titrant, complete

Electrodes

- Electrode: Pt 62 or Pt 62 RG combination electrode with a cable L 1 A
- or Pt 1200 for amperometric indication with cable L 1 NN

Reagents

- Titrant: phenylarsine oxide (PAO) standard solution 0,00564 N
- Acetate buffer pH = 4
- NaOH 1 mol/l
- Potassium iodide solution 5 %
- Distilled/DI water

Application

Description

Preparation of acetate buffer solution pH= 4

14,6 g Natriumacetate for analysis are dissolved in 40 ml DI water. To this solution is added 48 ml of glacial Aceticacide “Analytical grade”. Then it is filled up with DI water to 100 ml

Preparation of the potassium iodide solution 5 %

5 g of potassium iodide (analysis grade) are dissolved in 60 ml DI water, then it is filled up with DI water to 100 ml. This solution has to be freshly prepared every two days.

Preparation of NaOH 1 mol/l

4 g of NaOH for analysis dissolved in 60 ml DI water, then it is filled up with DI water to 100 ml

Total Chlorine

200 ml sample (measuring cylinder; for chlorine concentrations > 2 mg/l use less sample and fill up with dist. water to 200 ml) are filled into a 250 ml beaker. Add 1 ml KI solution and 1 ml buffer solution pH = 4.0 and titrate with the phenylarsine oxide to an equivalence point (potentiometry) or µA endpoint (amperometry)

Free (residual) Chlorine

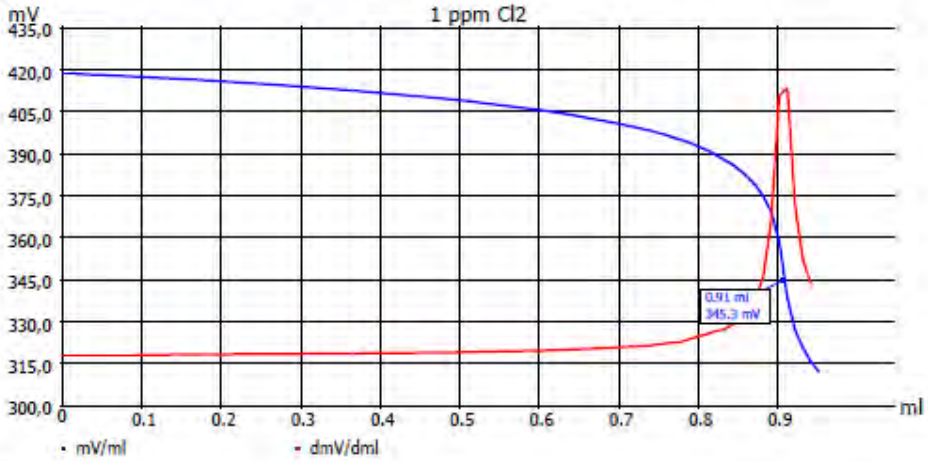
200 ml sample (measuring cylinder; for chlorine concentration > 5 mg/l use less sample and fill up with dist. water to 200 ml) are filled into a 250 ml beaker. Add 1 ml KI and 1 ml NaOH solution and titrate with the phenylarsine oxide to an equivalence point (potentiometry) or µA endpoint (amperometry)

Examples

Potentiometric titration > 0,2 mg/l Cl_2

GLP documentation

Titration graph



Method data

Method name:	Chlorine (dyn.)	Titration duration:	3 m 34 s
End date:	06.02.14	End time:	15:50:53

Titration data

Sample ID:	1 ppm Cl2	Pattern:	200.000 ml
Start mV:	418.8 mV	End mV:	311.9 mV
EQ:	0.908 ml / 345.3 mV	Chlorine:	0.91 mg/l

Calculation formula

Chlorine:	(EQ1-B)*T*M*F1/(V*F2)	Mol (M):	1.00000
Blank value (B):	0.0000 ml	Titre (T):	1.00000000 (m)
Factor 1 (F1):	200.0000	Pattern (V):	200.000 ml (m)
Factor 2 (F2):	1.0000	Statistics:	Off

Method data overall view

Method name:	Chlorine (dyn.)	Created at:	02/06/14 15:47:14
Method type:	Automatic titration	Last modification:	02/06/14 15:47:14
Measured value:	mV	Damping settings:	None
Titration mode:	Dynamic	Documentation:	GLP
Dynamic:	User-defined:	Max. step size:	0.2000 ml
		Slope max ml:	15.00 mV/min
		Min. step size:	0.0100 ml
		Slope min ml:	120.00 mV/min
Measuring speed / drift:	User-defined:	minimum holding time:	03 s
		maximum holding time:	15 s
		Measuring time:	03 s
		Drift:	10 mV/min
Initial waiting time:	0 s		
Titration direction:	Decrease		
Pretitration:	Off		
End value:	Off		
EQ:	On (1)		
Slope value:	User-defined	Value:	400

Dosing parameter

Dosing speed:	100.00 %	Filling speed:	30 s
Maximum dosing volume:	1.50 ml		

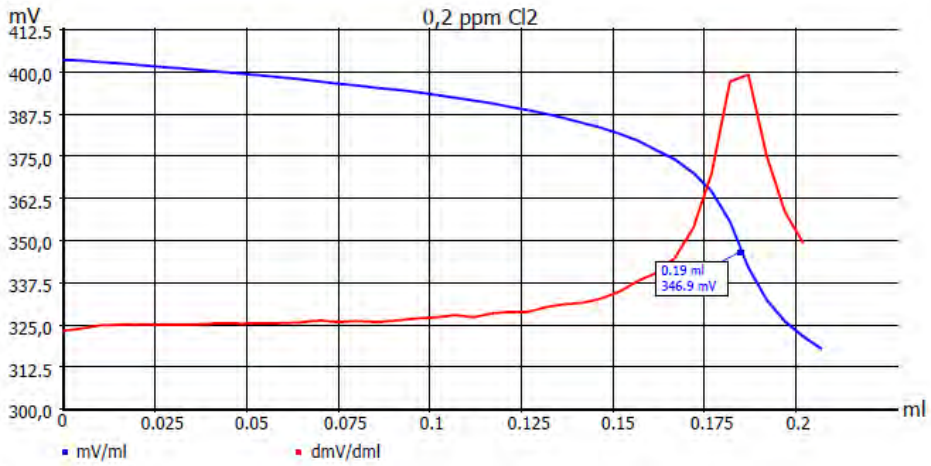
Unit values

Unit size:	10ml
Unit ID:	10035619
Reagent:	PAO
Batch ID:	no entry
Concentration [mol/l]:	0.00564
Determined at:	02/01/14 3:56:00
Expire date:	--
Opened/compounded:	--
Test according ISO 8655:	--
Last modification:	01/31/14 19:56:01

Potentiometric titration < 0,2 mg/l Cl_2

GLP documentation

Titration graph



Method data

Method name:	Chlorine (dyn.)	Titration duration:	3 m 49 s
End date:	06.02.14	End time:	17:07:43

Titration data

Sample ID:	0,2 ppm Cl2	Pattern:	200.000 ml
Start mV:	403.6 mV	End mV:	317.8 mV
EQ:	0.185 ml / 346.9 mV	Chlorine:	0.19 mg/l

Calculation formula

Chlorine:	(EQ1-B)*T*M*F1/(V*F2)	Mol (M):	1.00000
Blank value (B):	0.0000 ml	Titre (T):	1.00000000 (m)
Factor 1 (F1):	200.0000	Pattern (V):	200.000 ml (m)
Factor 2 (F2):	1.0000	Statistics:	Off

Method data overall view

Method name:	Chlorine (dyn.)	Created at:	02/06/14 17:03:49
Method type:	Automatic titration	Last modification:	02/06/14 17:03:49
Measured value:	mV	Damping settings:	None
Titration mode:	Dynamic	Documentation:	GLP
Dynamic:	User-defined:	Max. step size:	0.2000 ml
		Slope max ml:	15.00 mV/min
		Min. step size:	0.0050 ml
		Slope min ml:	120.00 mV/min
Measuring speed / drift:	User-defined:	minimum holding time:	03 s
		maximum holding time:	15 s
		Measuring time:	03 s
		Drift:	10 mV/min
Initial waiting time:	0 s		
Titration direction:	Decrease		
Pretitration:	Off		
End value:	Off		
EQ:	On (1)		
Slope value:	User-defined	Value:	350

Dosing parameter

Dosing speed:	100.00 %	Filling speed:	30 s
Maximum dosing volume:	1.50 ml		

Unit values

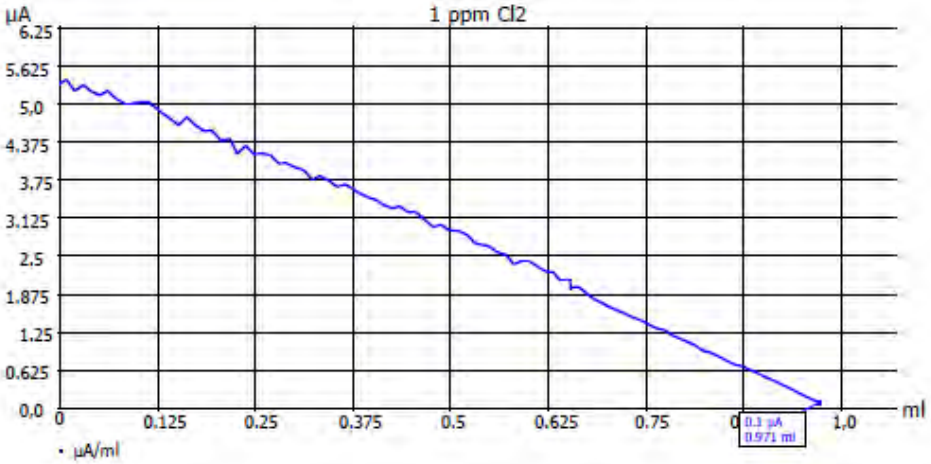
Unit size:	10ml
Unit ID:	10035619
Reagent:	PAO
Batch ID:	no entry
Concentration [mol/l]:	0.00564
Determined at:	02/01/14 3:56:00
Expire date:	--
Opened/compounded:	--
Test according ISO 8655:	--
Last modification:	01/31/14 19:56:01

Application

Dead stop titration > 0,2 mg/l Cl_2

GLP documentation

Titration graph



Method data

Method name:	Chlorine (DS)	Titration duration:	2 m 21 s
End date:	06.02.14	End time:	15:57:23

Titration data

Sample ID:	1 ppm Cl2	Pattern:	200.000 ml
Start µA:	5.492 µA	End µA:	0.051 µA
EP:	0.971 ml/ 0.1 µA	Chlorine:	0.97 mg/l

Calculation formula

Chlorine:	(EP-B)*T*M*F1/(V*F2)	Mol (M):	1.00000
Blank value (B):	0.0000 ml	Titre (T):	1.00000000 (m)
Factor 1 (F1):	200.0000	Pattern (V):	200.000 ml (m)
Factor 2 (F2):	1.0000	Statistics:	Off

Method data overall view

Method name:	Chlorine (DS)	Created at:	02/06/14 15:54:58
Method type:	Automatic titration	Last modification:	02/06/14 15:54:58
Measured value:	µA		
Titration mode:	d-stop	Documentation:	GLP
Linear steps:	0.010 ml		
Measuring speed / drift:	2 s		
Initial waiting time:	0 s		
Titration direction:	Decrease		
Pretitration:	Off		
Endpoint:	0.1 µA	delta endpoint:	2.0 µA
		Endpoint delay:	5 s
Polarization voltage:	100 mV		

Dosing parameter

Dosing speed:	25.00 %	Filling speed:	30 s
Maximum dosing volume:	2.00 ml		

Unit values

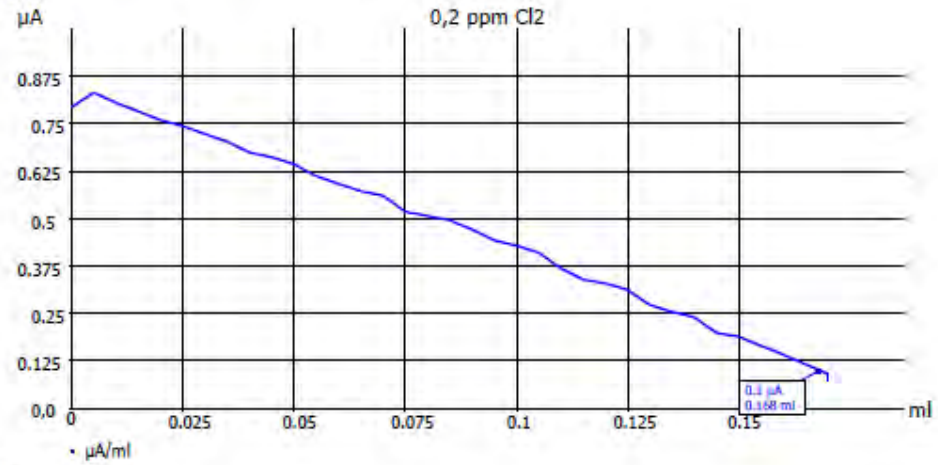
Unit size:	10ml
Unit ID:	10035619
Reagent:	PAO
Batch ID:	no entry
Concentration [mol/l]:	0.00564
Determined at:	02/01/14 3:56:00
Expire date:	--
Opened/compounded:	--
Test according ISO 8655:	--
Last modification:	01/31/14 19:56:01

Application

Dead stop titration < 0,2 mg/l Cl_2

GLP documentation

Titration graph



Method data

Method name:	Chlorine (DS)	Titration duration:	1 m 18 s
End date:	06.02.14	End time:	17:13:07

Titration data

Sample ID:	0,2 ppm Cl2	Pattern:	200.000 ml
Start µA:	0.790 µA	End µA:	0.072 µA
EP:	0.168 ml/ 0.1 µA	Chlorine:	0.17 mg/l

Calculation formula

Chlorine:	(EP-B)*T*M*F1/(V*F2)	Mol (M):	1.00000
Blank value (B):	0.0000 ml	Titre (T):	1.00000000 (m)
Factor 1 (F1):	200.0000	Pattern (V):	200.000 ml (m)
Factor 2 (F2):	1.0000	Statistics:	Off

Method data overall view

Method name:	Chlorine (DS)	Created at:	02/06/14 17:11:45
Method type:	Automatic titration	Last modification:	02/06/14 17:11:45
Measured value:	µA		
Titration mode:	d-stop	Documentation:	GLP
Linear steps:	0.005 ml		
Measuring speed / drift:	2 s		
Initial waiting time:	0 s		
Titration direction:	Decrease		
Pretitration:	Off		
Endpoint:	0.1 µA	delta endpoint:	2.0 µA
		Endpoint delay:	5 s
Polarization voltage:	100 mV		

Dosing parameter

Dosing speed:	25.00 %	Filling speed:	30 s
Maximum dosing volume:	2.00 ml		

Unit values

Unit size:	10ml
Unit ID:	10035619
Reagent:	PAO
Batch ID:	no entry
Concentration [mol/l]:	0.00564
Determined at:	02/01/14 3:56:00
Expire date:	--
Opened/compounded:	--
Test according ISO 8655:	--
Last modification:	01/31/14 19:56:01

Hints

If you have any questions on the application, you can feel free to contact us.

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