

1.11106.0001

## MQuant® Chloride Test

Cl<sup>-</sup>

### 1. Method

#### Titrimetric determination with titration pipette

In nitric solution chloride ions are titrated with mercury(II) nitrate solution against 1,5-diphenylcarbazone as the indicator, forming slightly dissociated mercury(II) chloride in the process. At the titration end-point, excess mercury(II) ions react with the indicator to form a blue-violet complex. The chloride concentration is determined from the consumption of titration solution (mercurimetric determination).

### 2. Measuring range and number of determinations

Measuring range <sup>1)</sup>	Graduation of the titration pipette	Number of determinations <sup>2)</sup>
2 - 200 mg/l Cl <sup>-</sup>	2 mg/l Cl <sup>-</sup>	200 at 170 mg/l Cl <sup>-</sup>

<sup>1)</sup> with 1 full pipette

<sup>2)</sup> In the case of chloride contents of more than 170 mg/l, the maximum number of determinations possible is fewer than 200 (see section 9).

### 3. Applications

#### Sample material:

Groundwater, surface water, and seawater (after dilution)  
Waters from aquaculture  
Drinking water and mineral water  
Water for concrete in the construction industry  
Industrial water and wastewater  
Boiler and boiler feed water, cooling water  
Swimming-pool water  
Food after appropriate sample pretreatment  
Soils and fertilizers after appropriate sample pretreatment

### 4. Influence of foreign substances

This was checked individually in solutions containing 150 mg/l Cl<sup>-</sup>. The concentrations of foreign substances usually present in the sample materials stated above as well as those given in the table lie below the limit at which the determination is interfered with. Cumulative effects were not checked; such effects can, however, not be excluded.

Concentrations of foreign substances in mg/l					
Br <sup>-</sup>	is measured at the same time	Fe <sup>3+</sup>	100	NO <sub>2</sub> <sup>-</sup>	50
CO <sub>3</sub> <sup>2-</sup>	1000	I <sup>-</sup>	is measured at the same time	S <sup>2-</sup>	1
				SO <sub>3</sub> <sup>2-</sup>	50

To avoid the stated interferences see section 6, "Preparation"

### 5. Reagents and auxiliaries

#### Please note the warnings on the packaging materials!

The test reagents are stable up to the date stated on the pack when stored closed at +15 to +25 °C.

#### Package contents:

1 bottle of reagent Cl-1 (indicator solution)  
1 bottle of reagent Cl-2  
2 bottles of reagent Cl-3 (titration solution)  
1 graduated 5-ml plastic syringe  
1 test vessel  
1 titration pipette  
1 card with brief instruction

#### Other reagents:

MQuant® Universal indicator strips pH 0 - 14, Cat. No. 1.09535  
Ammonia solution 25 % for analysis EMSURE®, Cat. No. 1.05432  
Nitric acid Titrisol® for 1 mol/l, Cat. No. 1.09966  
tetra-Sodium diphosphate decahydrate for analysis EMSURE®, Cat. No. 1.06591  
Hydrogen peroxide 30 % H<sub>2</sub>O<sub>2</sub> (Perhydrol®) for analysis EMSURE®, Cat. No. 1.07209  
Chloride standard solution Certipur®, 1000 mg/l Cl<sup>-</sup>, Cat. No. 1.19897

### 6. Preparation

- The pH must be within the range 1 - 12.**  
Adjust, if necessary, with ammonia solution or nitric acid.
- Preparation of the sample to avoid interferences due to **iron(III)**:  
Add aqueous, 5% tetra-sodium diphosphate solution and mix (2 drops per 5 ml of sample).
- sulfide and sulfite ions**:  
Add hydrogen peroxide 30% H<sub>2</sub>O<sub>2</sub> (Perhydrol®) and mix (1 drop of Perhydrol® per 10 ml of sample).

### 7. Procedure

Rinse the test vessel several times with the pretreated sample.		
Pretreated sample (15 - 30 °C)	5 ml	Inject into the test vessel with the syringe.
Reagent Cl-1	2 drops <sup>1)</sup>	Add and swirl. The sample generally turns <b>blue</b> in color.
Reagent Cl-2	dropwise <sup>1)</sup>	Add while swirling until the color changes to <b>yellow</b> .
Place the titration pipette <b>loosely</b> on the open reagent bottle Cl-3. <b>Slowly</b> withdraw the piston of the titration pipette from the lowest position until the <b>lower</b> edge of the black piston seal is level with the zero mark of the scale. (This fills <b>only the dropping tube</b> with titration solution.) Remove the titration pipette and briefly wipe the tip of the dropping tube. Then <b>slowly</b> add the titration solution dropwise to the sample <b>while swirling</b> until its color changes from <b>yellow to blue-violet</b> . Shortly before the color changes wait a few seconds after adding each drop. Read off the result in mg/l from the scale of the titration pipette at the <b>lower</b> edge of the black piston seal.		

<sup>1)</sup> **Hold the bottle vertically while adding the reagent!**

#### Notes on the measurement:

- While filling the titration pipette, it must **not** be screwed tightly on the reagent bottle!
- After the analysis inject any titration solution still remaining in the pipette back into the reagent bottle Cl-3 and **close the reagent bottle tightly using the pipette instead of the screw cap**.

### 8. Method control

To check test reagents, measurement device, and handling:  
Dilute the chloride standard solution with distilled water to 150 mg/l Cl<sup>-</sup> and analyze as described in section 7.  
Additional notes see under [www.qa-test-kits.com](http://www.qa-test-kits.com).

### 9. Notes

- Reclose the reagent bottles immediately after use.
- Store the reagent bottle Cl-3 (titration solution) **with the titration pipette firmly attached** lying flat in the corresponding depression in the pack.
- Rinse the test vessel and the syringe **with distilled water only**.
- In titrimetric determinations the consumption of titration solution is dependent on the concentration of the substance to be determined. The quantities of indicator and titration solution contained in the reagent bottles have been calculated to suffice for 200 determinations each of 170 mg/l Cl<sup>-</sup>. The following applies for other chloride contents:

Chloride content mg/l	Number of determinations	Indicator solution	Titration solution
2 - 170	200	is used up completely	A remainder is left over.
>170	<200	A remainder is left over.	is not sufficient for 200 determinations

- The contents of the test vessel as well as the test reagents must not be run off with the wastewater!**  
**Information on disposal can be obtained at [www.disposal-test-kits.com](http://www.disposal-test-kits.com).**

