



## Application Note AN-T-075

# 自来水中的率、pH、度和化物

## Fully automated determination including sample preparation

The analysis of tap water plays an important role to assess the water quality or to identify its possible contamination. Parameters such as conductivity, pH value, alkalinity, and chloride content are routinely measured.

In this application note, a fully automated system is presented which allows the determination of several parameters according to various standards within one analysis. These include conductivity (ISO 7888, EN 27888, ASTM D1125, EPA 120.1), pH value (EN ISO 10523, ASTM D1293, EPA 150.1), alkalinity (EN ISO

9963, ASTM D1067, EPA 310.1), and chloride content (ISO 9297, ASTM D512, EPA 325.3). Additionally the system transfers the required volume of sample into an external titration vessel, further reducing manual sample preparation. Furthermore, all sensors can be calibrated automatically and the titer of each titrant can also be determined.

This high degree of automation minimizes errors and guarantees outstanding reproducibility by freeing up valuable time for operators.

## SAMPLE AND SAMPLE PREPARATION

The method is demonstrated for a tap water sample. No sample preparation is required as the system automatically transfers the defined

sample volume to the external titration cell after conductivity measurement.

## EXPERIMENTAL

This analysis is carried out automatically on an 815 Robotic USB Sample Processor XL equipped with two external titration vessels. One is set up with an iAquatrode plus, and the second one is set up with an iAg-Titrode.

The samples are poured into beakers and placed onto the rack. The conductivity measurement is performed directly in the beaker using a 5-ring conductivity measuring cell with integrated temperature sensor. Afterwards, a sample aliquot is transferred into the first external titration vessel where the pH measurement and then the alkalinity titration (using standardized HCl solution) is performed. Then, a second aliquot is pipetted into the second titration vessel, where (after an acidification step) the chloride is titrated with standardized silver nitrate solution. Finally, the cleaning of both titration vessels and sensors is carried out automatically.

The pH electrode and the conductivity measuring cell are calibrated prior to the analysis.



**Figure 1.** Example system: 815 Robotic USB Sample Processor XL with an external titration vessel, 905 Titrando and 856 Conductivity Module equipped with iAquatrode plus, iAg-Titrode, and 5-ring conductivity measuring cell for the analysis of tap water.

## RESULTS

The system enables reproducible results for all analyzed parameters. The overall analysis time

for one sample is less than 15 minutes. All results are summarized in **Table 1**.

**Table 1.** Analyzed parameters for tap water (n = 10).

Parameter	Mean	SD(rel) in %
Conductivity	557.8 $\mu\text{S}/\text{cm}$	2.27
pH value	7.89	0.65
p-value	N/A	N/A
m-value	5.60 mmol/L	0.36
Chloride	10.72 mg/L	1.08

## CONCLUSION

The high degree of automation for water analysis allows an increase in sample throughput, minimizes errors, and guarantees outstanding reproducibility. As the presented system includes sample preparation, the sample only needs to be placed in a beaker onto the rack, and the system runs all analyses

(conductivity, pH value determination, alkalinity, and chloride) autonomously. The automatic and accurate addition of the solutions combined with the automated system frees up valuable time of the operator and therefore increases the productivity in the lab.

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## CONTACT

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## CONFIGURATION



### 815 Robotic USB Sample Processor XL (1T/0P)

Robotic USB Sample Processor XL 包括一个工作站,可用于自理大量常品系列以及完成品前理或并列理流程。可再接多台(隔膜或蠕)和三台加液器用来行 LQH 加液理。

由于其用范很广,因此必根据具体用来合的品、拌器、滴定、机械臂和 Swing Head 以及品容器并独。通 Touch Control 通 "stand alone" 控制。有以下 PC 控制用件品可供: 滴定件 tiamo™、色分析件 MagIC Net、伏安法件 viva 或 OMNIS。



### 843 ()

843 ()



### 856 Conductivity Module

Titrande « » 900 Touch Control 856 Conductivity Module

Conductivity Module 2 USB ,, 4 MSB Dosino OMNIS-Software tiamo- Touch Control, GMP/GLP FDA , 21 CFR 11



### 905 Titrande

- 800 Dosino
- (DET)(MET)(SET)
- (MEAS CONC)
- ,LQH
- MSB
- "iTrode"
- USB
- OMNIS-Software tiamo- Touch Control
- , GMP/GLP FDA , 21 CFR 11



5  $c = 0.7 \text{ cm}^{-1}$  Pt1000  
 5  $c = 0.7 \text{ cm}^{-1}$  (), Pt1000 (1.2 m), 856  
 (5  $\mu\text{S/cm}$  20  $\text{mS/cm}$ ),:

-  
 -  
 -



iAquatrode Plus Pt1000

Pt1000 (,) pH / pH

$c(\text{KCl}) = 3 \text{ mol / L}$  ,  
 (,  $c(\text{KNO}_3) = 1 \text{ mol/L}$  (6.2310.010))  
 iTrodes Titrand, Ti-Touch 913/914



iAg-Titrode

pH 玻璃膜且集成了传感器数据芯片的智能合式形,用作参比。

免用于 pH 恒定的滴定(硝酸滴定),例如:

- 化物、化物、化物
- 硫化物
- 硫化
- 硫醇
- 化物

存放在蒸水中。

据具体用,建使用  $\text{Ag}_2\text{S}$  的 Ag Titrode,其可以相。

iTrodes 可在 Titrand、Ti-Touch 或 913/914 Metern 上使用。