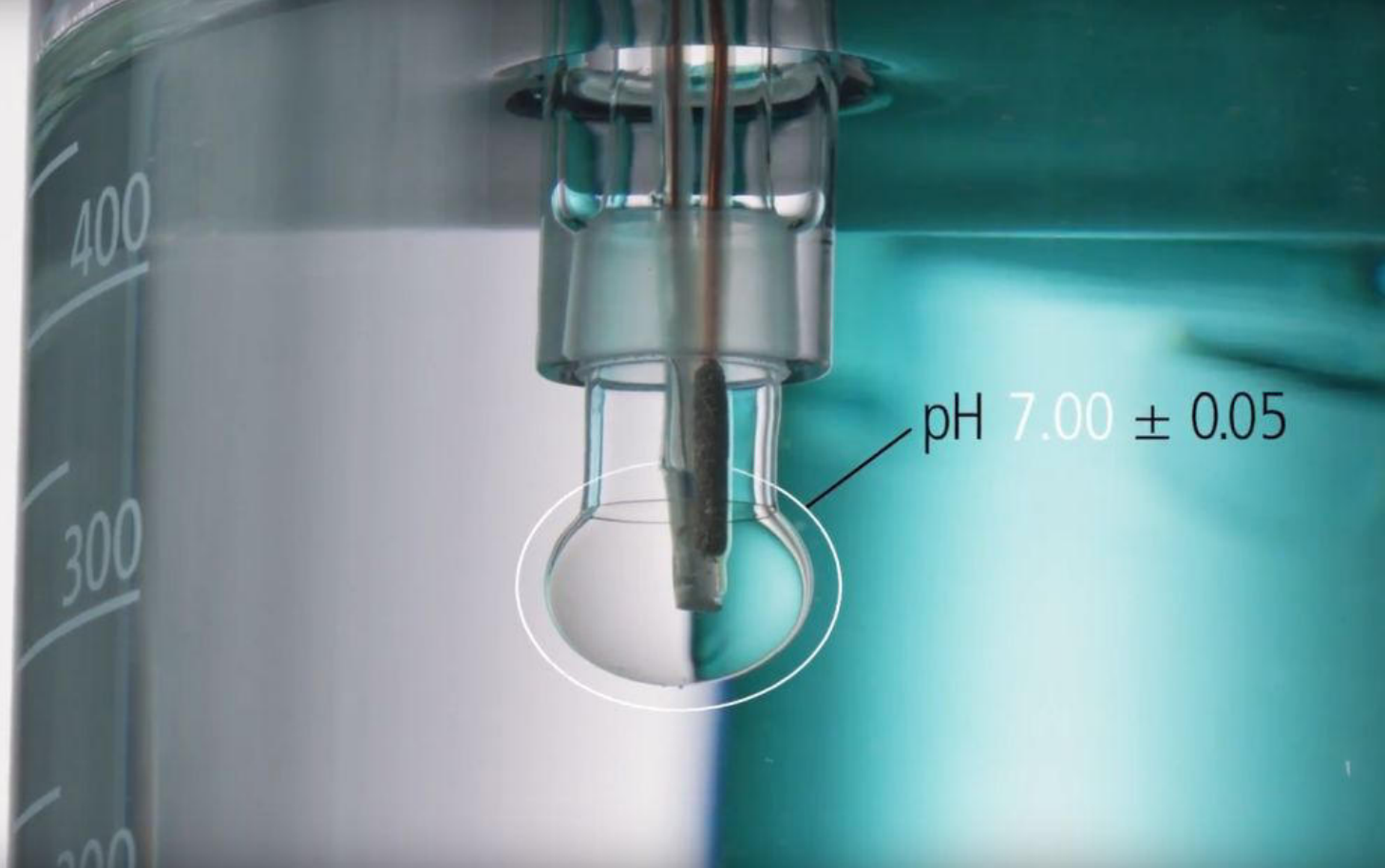




Application Note AN-T-236

氢氧化钠法测定盐酸

Fast and reliable potentiometric titration of HCl with NaOH

Hydrochloric acid (HCl) is a strong inorganic acid also classified as a mineral acid. HCl is an essential solution with great significance in the chemical industry. Among other things, it is used in the processing of ores, serves as a cleaning agent, or is used during metal processing for pickling, etching, and soldering. Hydrochloric acid is also an important standard solution in the pharmaceutical industry.

The potentiometric titration of hydrochloric acid

with sodium hydroxide is one of the most important and also most frequent analyses performed in the laboratory. Titration is best suited for this purpose. The method is very accurate, inexpensive, and fast.

In this Application Note, an acid-base titration is presented where the concentration of HCl is determined with sodium hydroxide (NaOH) using a pH electrode with an integrated Pt1000 temperature sensor for the most accurate results.

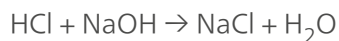
SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on $c(\text{HCl}) = 1$

mol/L. Sample preparation is not required.

EXPERIMENTAL

The determinations are carried out on an Eco Titrator equipped with a Unitrode with integrated Pt1000 (**Figure 1**). The acidic HCl reacts with a basic solution of NaOH via the following neutralization reaction mechanism:



An appropriate amount of sample is pipetted into the titration beaker, then deionized water is added. Afterwards, the solution is titrated until after the first endpoint with standardized sodium hydroxide.



Figure 1. The Eco Titrator from Metrohm equipped with a Unitrode with integrated Pt1000.

RESULTS

This method offers very accurate results, as displayed in **Table 1**. One exemplary titration

curve of HCl is shown in **Figure 2**.

Table 1. Results of the potentiometric titration of HCl (n = 10).

Sample (n = 10)	NaOH in mL	HCl in mol/L	Recovery in %
Mean value	4.994	0.999	100.00
SD(abs)	0.00	0.00	0.05
SD(rel) in %	0.05	0.05	0.05

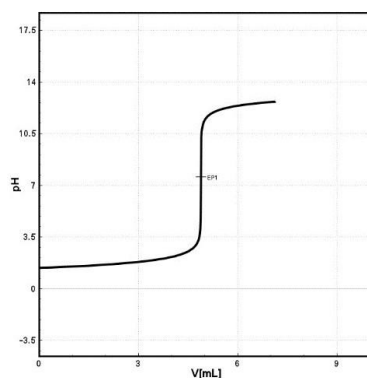


Figure 2. Titration curve of the potentiometric determination of hydrochloric acid. The equivalence point (EP) was found at approximately pH = 7.0.

CONCLUSION

HCl titration with NaOH is one of the absolute methods of routine laboratory analysis. The compact Eco Titrator with integrated magnetic stirrer and touch-sensitive user interface is ideal for this kind of acid-base titration. The system is user-friendly and cost-effective. Pre-installed methods on the Eco

Titration make it easy for customers without laboratory experience to get started creating precise, fast, reliable, and GLP-compliant results. With a small footprint (approximately DIN A4), the Eco Titrator is suitable for laboratories even with space limitations.

CONTACT

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CONFIGURATION



Eco Titrator

紧凑型 Eco Titrator 具有内置磁力搅拌器和触摸感应式用户界面,可以满足日常分析需求。其始终提供符合 GLP 标准的结果。

普遍适用于几乎所有电位分析式滴定,例如:

- 食品:脂肪的酸度、氯化物、维生素 C、碘和过氧化物值
- 水分析:碳酸盐和 Ca/Mg 硬度、氯化物、硫酸盐、高锰酸盐指数
- 石化:酸/碱值、硫化物和硫醇、氯化物、溴值
- 电镀:总酸度、金属含量、氯化物
- 表面活性剂分析:阴离子、阳离子和非离子表面活性剂
- 光度计与光度电极:p 和 m 值、金属、水硬度