



Application Note AN-T-102

Standardization of hydrochloric acid with TRIS

Correct titer improves the accuracy of results

Titriments are normally bought ready to use. However, the certified value is only valid at a defined temperature because the titrant density varies with temperature. With time and especially after opening the bottle of your titrant, the properties thereof will change because of evaporation of water and uptake of carbon dioxide. Due to these facts, it is necessary to determine the accurate concentration of your titrant solution on a regular basis using a primary standard. To correct the mentioned variation, a so-called «titer factor» is applied.

In case of hydrochloric acid as titrant, the primary standard to use is TRIS (Tris(hydroxymethyl)aminomethan). TRIS is inert, does not sublime, and reacts with hydrochloric acid according to a defined chemical reaction.

The titer can be easily and quickly assessed by using the Metrohm brand of autotitrators. Predefined calculation formulas implemented in Metrohm titrators or software, respectively, as well as the automatic storage of the titer factor, makes standardization a simple task.

SAMPLE AND SAMPLE PREPARATION

High purity TRIS is used for the standardization of hydrochloric acid. TRIS is dried in a drying

oven for several hours and allowed to cool down to ambient temperature in a desiccator.

EXPERIMENTAL

An appropriate amount of TRIS standard is added accurately to a beaker and dissolved with deionized water. The solution is titrated against hydrochloric acid until after the equivalence point is reached.

The sample size must be chosen according to the buret volume (equivalence point between 10–90% of buret volume).

If a small cylinder unit (2 or 5 mL cylinder unit) is used for titration, it is recommended to make a stock solution and use an aliquot thereof for titration. This increases the accuracy for these burets.

RESULTS

A six-fold determination exhibited a mean titer value of 1.0069 with an absolute standard deviation of 0.0037 and a relative standard deviation of 0.37%.

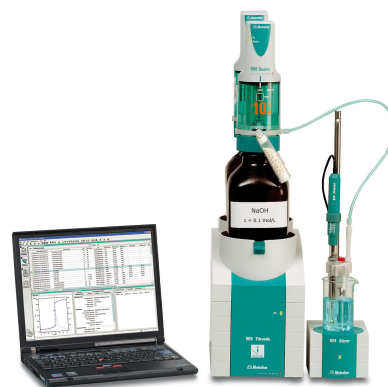


Figure 1. 905 Titrando with tiamo. Example setup for the titer determination of hydrochloric acid.

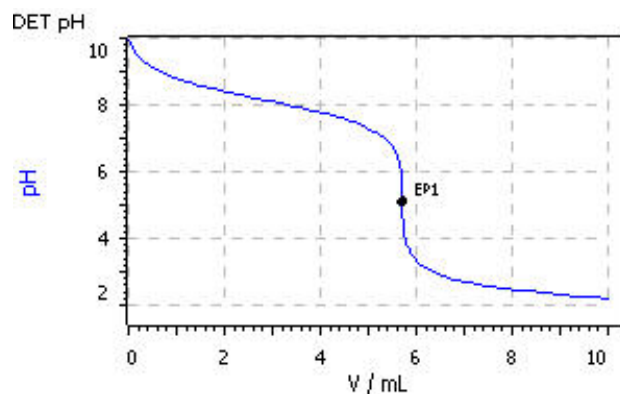


Figure 2. Example curve of a titer determination of hydrochloric acid with TRIS as primary standard.

CONCLUSION

The determination of the titer of hydrochloric acid is performed both quickly and reproducibly. Easy, fast, and precise titer determination using Metrohm autotitrators results in reliable titration analyses. Predefined calculation formulas

implemented in these titrators or software, respectively, as well as the automatic storage of the titer factor makes standardization a simple task.

CONTACT

メトロームジャパン株式会社
143-0006 東京都大田区平
和島6-1-1
null 東京流通センター アネ
ックス9階

metrohm.jp@metrohm.jp

CONFIGURATION



905 Titrando

Dosino-トーションクシステムを用いた用途のための測定インターフェースを備えた電位差滴定のためのハイエント滴定装置。

- タイフ800 Dosinoのトーションクシステムが4つまで
- 変動滴下量当量点滴定 (DET)、等量滴下当量点滴定 (MET)、終点滴定 (SET)
- イオン選択性電極を用いた測定 (MEAS CONC)
- モニタリング、LQHを備えたトーションク機能
- 追加スターラーまたはトーションクシステムのための4つのMSBコネクタ
- インテリシエント電極「iTrode」
- USB コネクタ
- OMNISソフトウェア、*tiamo*ソフトウェアもしくはTouch Controlを適用
- GMP/GLP基準およびFDA 基準21 CFR Part 11の要件を満たしています(必要な場合)



Unitrode

pH滴定のための複合pH電極。これは、特に以下の用途に適しています:

- 困難なサンプル、粘性のあるサンプル、あるいはアルカリ性のサンプルにおけるpH滴定
- 高温時

固定クラントジョイントタイアフラムは汚れに対して耐性があります。

参照内部液: $c(\text{KCl}) = 3 \text{ mol / L}$ 、保存液で保管。

代替: $T > 80^\circ \text{C}$ での滴定用参照内部液: イトロライト、イトロライトで保管。