

Application Note AN-T-244

Standardization of sodium thiosulfate

Titration procedure for titer of 0.01 and 0.002 mol/L sodium thiosulfate.

Accurate titer determinations of titrant solutions are essential for reliable and precise titration results. Titrations sometimes involve diluted solutions (e.g., 0.01 and 0.002 mol/L) which present unique challenges. The low concentration of the titrant can lead to sluggish electrode responses, making it difficult to obtain stable readings during the titration. This situation requires slow titration parameters to avoid overtitration and to smooth the titration curve, with the aim of obtaining the «S» shaped plot expected for a good potentiometric titration curve.

Additionally, the small amounts of primary standard required for these dilutions can introduce weighing errors and contribute to increased variability in the final titer values. To prevent this, the most accurate alternative is to prepare solutions of the primary standard with the same concentration as the titrant and use a macro pipette to carry out the aliquoting.

This Application Note describes the procedure for performing a titer determination of sodium thiosulfate (0.01 and 0.002 mol/L) using the OMNIS Titrator and a Pt Titrode.

AUXILIARY SOLUTIONS

The following solutions are required for this study. These should be prepared with analytical grade reagents.

- 0.01 and 0.002 mol/L $Na_2S_2O_3$ – titrant
- 0.01 and 0.002 mol/L KIO_3 – standard
- 1% KI
- 0.1 mol/L H_2SO_4

EXPERIMENTAL

$Na_2S_2O_3$ – 0.01 mol/L

Pipet 1 mL of 0.01 mol/L KIO_3 standard solution, add 10 mL of 1% KI, then add 10 mL of 1 mol/L H_2SO_4 and deionized water until the bulb and metal ring of the Pt Titrode are covered. Titrate to the first endpoint at approximately 6 mL.

$Na_2S_2O_3$ – 0.002 mol/L

Pipet 1 mL of 0.002 mol/L KIO_3 standard solution, then add 2 mL of 1% KI, 2 mL of 0.1 mol/L H_2SO_4, and add deionized water until the bulb and metal ring of the Pt Titrode are covered. Titrate to the first endpoint at approximately 6 mL.

RESULTS

Results of the titer determination of $Na_2S_2O_3$ – 0.002 mol/L (**Table 1**) and 0.01 mol/L (**Table 2**) – were calculated according to the following equation where $c_{standard}$ is the concentration of KIO_3 standard solution, $V_{standard}$ is the volume of KIO_3 standard solution, V_{EP} is the volume of thiosulfate titrant, and 6 is the stoichiometric factor. An example titration curve for the titer determination is shown in **Figure 1**.

$$\text{Molarity (mol/L)} = \frac{c_{standard} \times V_{standard} \times 6}{V_{EP1}}$$

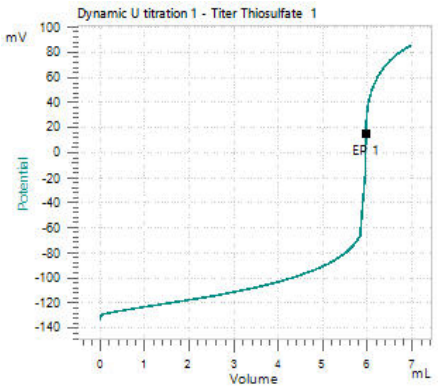


Figure 1. Exemplary titration curve of the titer determination of sodium thiosulfate with the OMNIS Titrator and a Pt Titrode.

Table 1. Results of the 2 mmol/L sodium thiosulfate titer determination.

No. (n = 5)	Mean value in mmol/L	s(abs) in mmol/L	s(rel) in %
1	2.008	0.013	0.6

Table 2. Results of the 10 mmol/L sodium thiosulfate titer determination.

No. (n = 5)	Mean value in mmol/L	s(abs) in mmol/L	s(rel) in %
1	10.057	0.041	0.4

COMMENTS

The drift is set to 30 mV/min; the minimum volume increment is 20 µL, and maximum increment is 150 µL.

CONCLUSION

The OMNIS Titrator equipped with a Pt Titrode reliably determines titer concentration in diluted titrants through sensitive and flexible analyses combined with high-end software.
Only fine adjustment of the titration parameters and the Pt Titrode electrode are necessary when using the OMNIS Titrator. The electrode is sensitive enough to respond adequately to potential differences during titration, resulting in an ideal titration curve.

CONTACT

Metrohm Taiwan Ltd.
開封街二段 46 號 5 樓
108 台北市
info@metrohm.com.tw

CONFIGURATION



OMNIS Professional Titrator

创新型、模块式电位分析 OMNIS Titrator,适于独立运行或作为 OMNIS 滴定系统的核心元件运行,用于终点和等当点滴定(单一/动态)。由于采用 3S OMNIS Liquid Adapter 技术,处理化学品从未像现在一样安全。可以使用测量模块和计量管单元自由配置滴定仪,并在需要时扩展一台棒式搅拌器。包括用于使用其他滴定或加液模块平行滴定的“Professional”功能许可证。

- 通过计算机或本地网络控制
- 可以为其他应用或辅助溶液另外连接最多四个滴定模块或加液模块
- 棒式搅拌器的连接方式
- 可提供不同大小的计量管:5、10、20 或 50 mL
- 采用 3S 技术的 OMNIS Liquid Adapter:安全处理化学品,自动传输生产厂家的原始试剂数据

测量模式和软件选项:

- 终点设定滴定:“Basic” 功能许可证
- 终点和等当点滴定(单一/动态):“Advanced” 功能许可证
- 终点和等当点滴定(单一/动态),包括 5 路平行滴定:“Professional” 功能许可证



OMNIS 20 mL

智能型计量管单元 20 mL,用于 OMNIS 滴定仪、滴定模块或 Dosing 模块。包括计量软管和防扩散滴管。



OMNIS

A WHOLE NEW LEVEL OF PERFORMANCE

dPt Titrode

带 pH 玻璃膜的 OMNIS 用数字组合式铂环形电极,用作参比电极。

该免维护电极适用于 pH 值恒定的氧化还原滴定,例如:

- 碘量法
- 重铬酸钾法
- 铈量法
- 高锰酸盐滴定法

该电极存放在蒸馏水中。

dTrodes 可在 OMNIS Titratoren 上使用。

OMNIS

允许单机版 OMNIS 软件在一台 WindowsTM 计算机上运行。

特性:

- 该许可证已含有一份 OMNIS 设备许可证。
- 须通过万通许可授权平台进行激活。