



Application Note AN-T-227

Determination of sodium lactate

Comparison of USP–NF 2021, Issue 2 and a modified method for absolute sodium lactate content via titration

Sodium lactate is a salt form of lactic acid used in foodstuffs, cosmetics, paper, clothes, biopolymers, and in medicine. As it is used in many regulated industries, an accurate determination of the lactate content is required and is already covered in several norms. One exemplary monograph by the US Pharmacopoeia (USP) results in high accuracies and well-defined titration curves but uses titrants and solvents that are more costly than necessary. This USP method requires a blank determination, glacial acetic acid and acetic anhydride as solvents, and a solution of

perchloric acid in acetic acid as titrant.

In comparison, the presented modified method from Metrohm requires a 1:1 mixture of water and acetone and uses aqueous hydrochloric acid as titrant, resulting in an estimated cost reduction of 40% per titration compared to the USP method (USP–NF 2021, Issue 2). Furthermore, the time needed for each analysis is reduced to just 12% of the USP method (excluding blank determination).

This Application Note presents both methods to determine lactate content and shows the results obtained on an OMNIS system.

SAMPLE AND SAMPLE PREPARATION

Solid sodium lactate (300 mg) is dissolved in 100 mL of deionized water.

USP: Sample equivalent to 300 mg lactate is weighed accurately and dissolved in a 5:1 mixture of acetic anhydride and glacial acetic

acid. The sample is allowed to stand for 20 minutes. Blank samples are also prepared.

Metrohm: Dilute a sample equivalent to 300 mg in a 1:1 mixture of acetone and water.

EXPERIMENTAL

USP: Titrate the blank and sample with 0.1 N perchloric acid until after the first equivalence point.

Metrohm: Titrate the sample directly with 0.1 mol/L HCl solution until after the first equivalence point (EP).



Figure 1. OMNIS Titrator with the digital pH electrode and an OMNIS Dosing Module.

Table 1. Summarized results for the sodium lactate determination (n = 3).

Method	Recovery	RSD (%)
USP	97.77	0.53
Metrohm	96.56	0.93

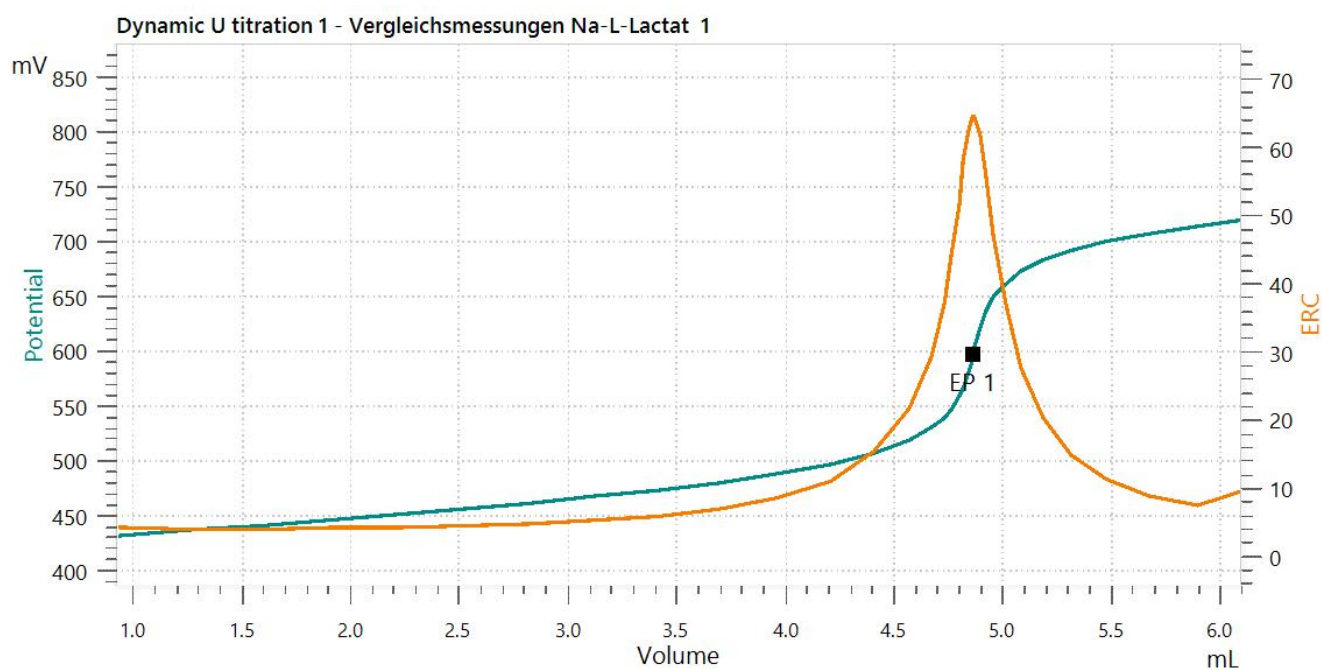


Figure 2. Exemplary titration curve according to USP of an aliquot of sodium lactate against perchloric acid as titrant.

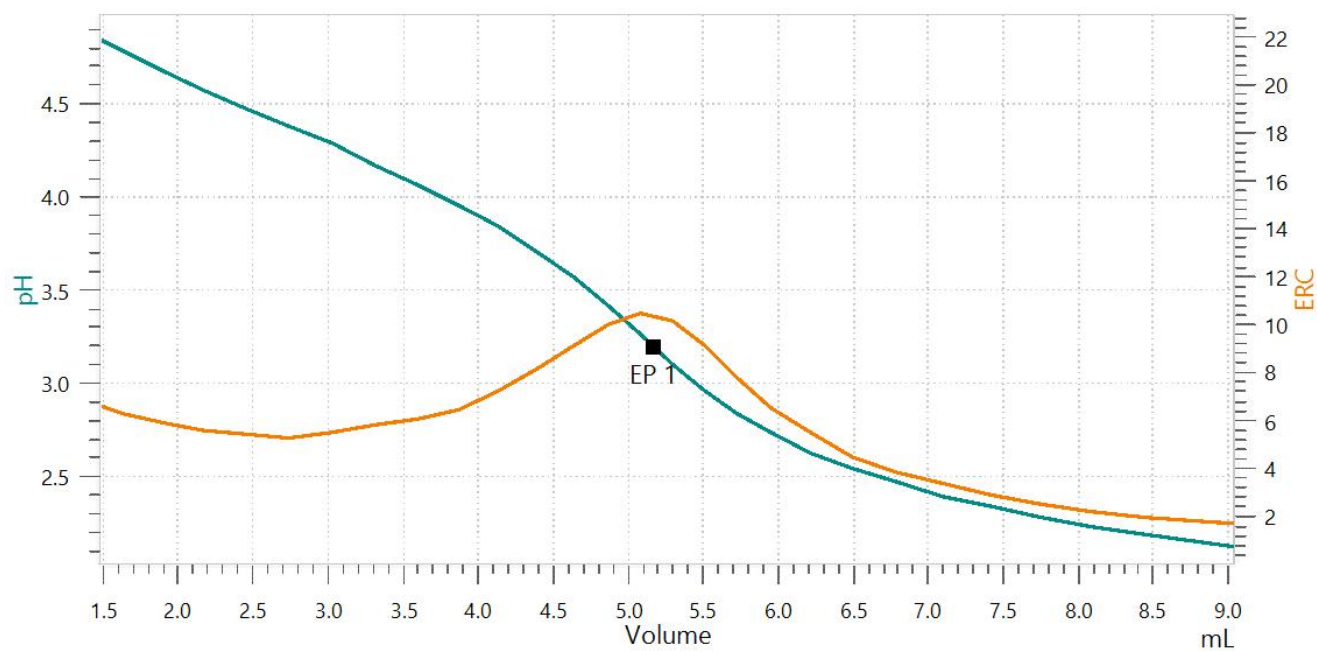


Figure 3. Exemplary titration curve of an aliquot of sodium lactate against HCl as titrant.

CONCLUSION

Both methods for the determination of lactate show comparable results. The USP method is slower and more expensive but the obtained EP has a higher potential jump and ERC. However, the method gives a second EP after this region that is unrelated to sodium lactate. The

Metrohm modified method is faster and cost-efficient but shows slightly lower recoveries and the EP is less pronounced. In contrast to the USP method, the Metrohm method does not show a second EP and is therefore less ambiguous as well.

CONTACT

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CONFIGURATION



OMNIS Advanced Titrator

新型、模式位分析 OMNIS Titrator 滴定,于独立行或作 OMNIS 滴定系的核心元件行,用于使用 OMNIS Sample Robot 行点和等当点滴定(一/)。由于采用 3S 瓶配器技,理化学品从未像在一安全。可以使用量模和量管元自由配置滴定,并在需要展一台螺旋拌器。在需要可以通相的件功能可平行滴定升 OMNIS Advanced Titrator。

- 通算机或本地网控制
- 可以其他用或助溶液外接最多四个滴定模或加液模
- 螺旋拌器的接方式
- 可提供不同大小的量管:5、10、20 或 50 mL
- 采用 3S 技的瓶配器:安全理化学品,自生商的原始数据

量模式和件:

- 点定滴定:“Basic” 功能可
- 点和等当点滴定(一/):“Advanced” 功能可
- 点和等当点滴定(一/),包括平行滴定
- “Professional” 功能可



OMNIS Dosing Module

用于与 OMNIS Titrator 滴定相的加液模,以展外用于
滴定/加液的滴定管。可以展磁力拌器和/或螺旋拌器
,以作独的滴定台使用。可自由 5、10、20 或 50 mL
量管元。



dEcotrode Plus

用于 OMNIS 的数字、合式 pH 。

用于酸/水溶液滴定。

固定套管式隔膜染不敏感。

参比解: $c(\text{KCl}) = 3 \text{ mol / L}$,存在保存液中。

dTrodes 可在 OMNIS Titratoren 上使用。