



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

RESULTS

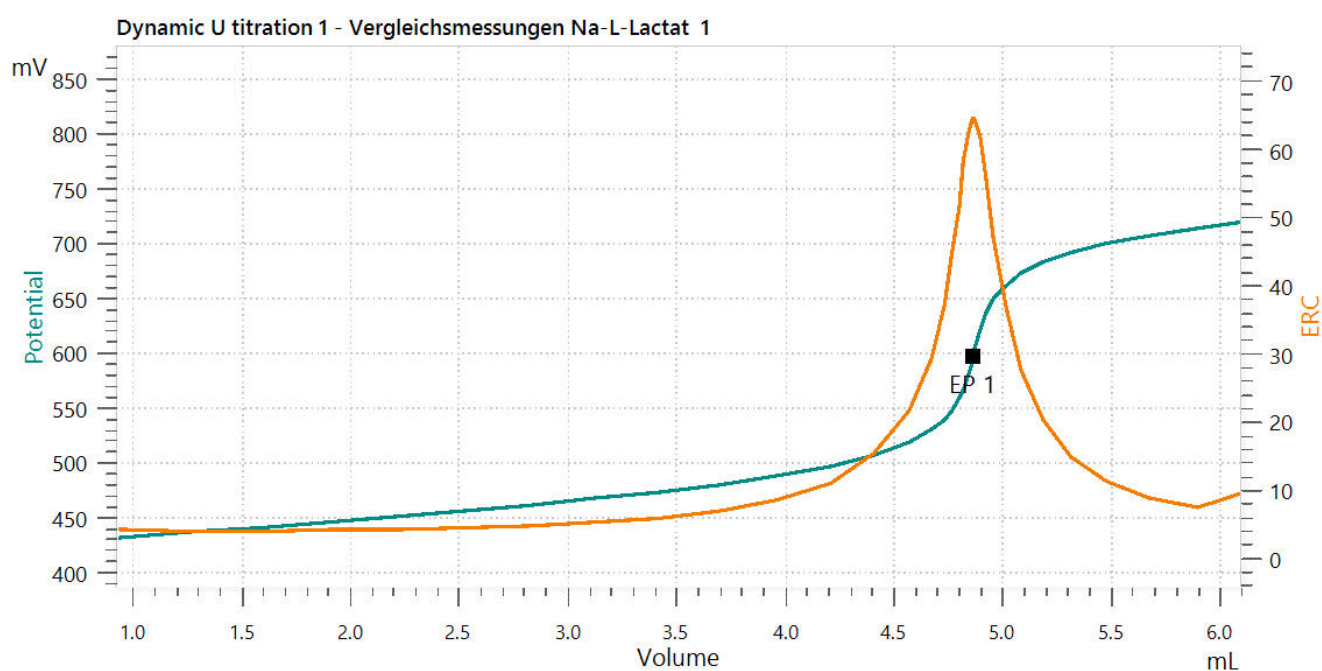


Figure 2. Exemplary titration curve according to USP of an aliquot of sodium lactate against perchloric acid as titrant.

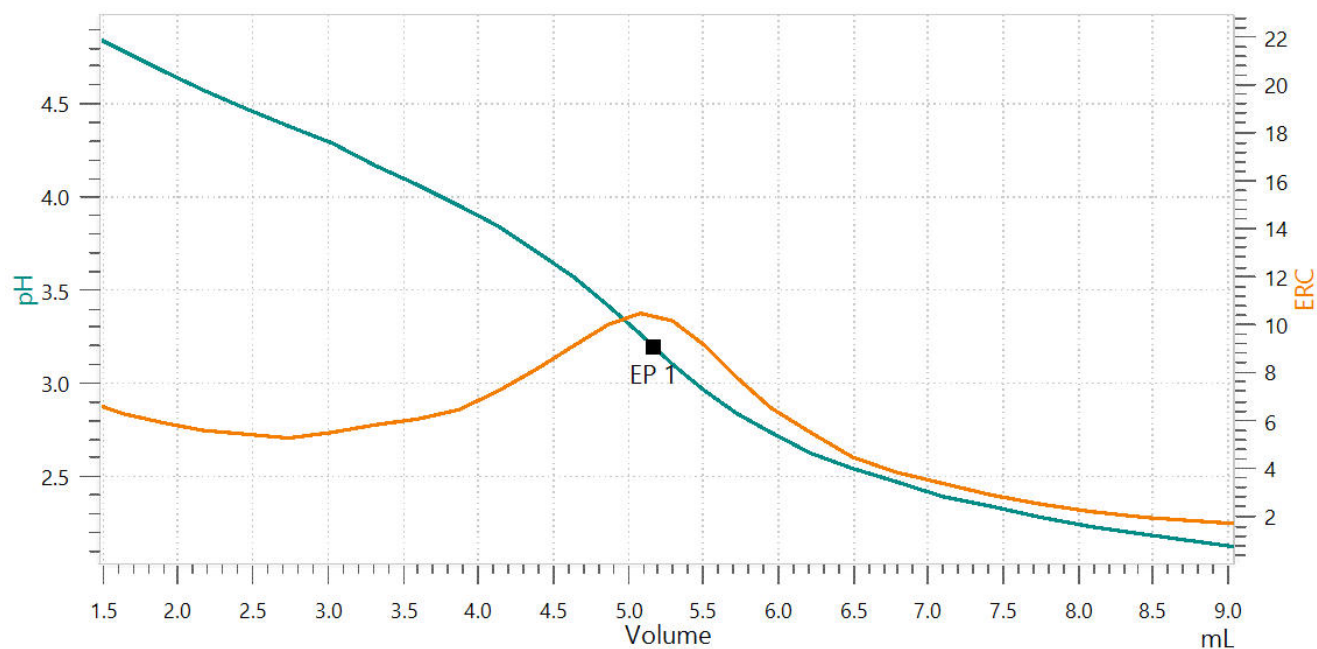


Figure 3. Exemplary titration curve of an aliquot of sodium lactate against HCl as titrant.

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.

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CONFIGURATION



OMNIS Advanced Titrator

创新型、模块式电位分析 OMNIS Titrator 滴定仪,适于独立运行或作为 OMNIS 滴定系统的核心元件运行,用于使用 OMNIS Sample Robot 进行终点和等当点滴定(单一/动态)。由于采用 3S 试剂瓶适配器技术,处理化学品很安全。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螺旋搅拌器。在需要时可以通过相应的软件功能许可证为平行滴定升级 OMNIS Advanced Titrator。

- 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四个滴定模块或加液模块
- 螺旋搅拌器的连接方式
- 可提供不同大小的计量管:5、10、20 或 50 mL
- 采用 3S 技术的试剂瓶适配器:安全处理化学品,自动传输生产商的原始试剂数据

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),包括平行滴定:“Professional” 功能许可证



OMNIS Dosing Module

用于与 OMNIS Titrator 滴定仪相连的加液模块,以扩展额外用于滴定/加液的滴定管。可以扩展磁力搅拌器和/或螺旋搅拌器,以作为单独的滴定台使用。可自由选择 5、10、20 或 50 mL 计量管单元。



dEcotrode Plus

用于 OMNIS 的数字、组合式 pH 电极。

该电极适用于酸/碱水溶液滴定。

固定套管式隔膜对污染不敏感。

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

dTodes 可在 OMNIS Titratoren 上使用。