



Application Note AN-T-215

氢氧化锂和碳酸锂的测定

Precise and reliable determination by potentiometric titration

Lithium salts (e.g., lithium carbonate and lithium hydroxide) are used in many applications such as the production of electrolyte and cathode materials in lithium ion batteries. Furthermore, lithium hydroxide is used for the production of lithium stearate, an important lubricant for cars and airplanes. In addition, it is utilized as an air purifier due to its ability to bind carbon dioxide. While the majority of lithium carbonate is used for aluminum production, it is also used for the glass and ceramic industry. Lithium carbonate

lowers the melting point of these materials. Thus, the electricity costs are cheaper to produce them. Additionally, it is a treatment of mental illnesses such as depression or bipolar disorder. For all of these applications, it is important to know the quality of the pure lithium salts used in the various production processes. This Application Note presents an easy method for the assay of lithium hydroxide and lithium carbonate on an automated OMNIS system.

SAMPLE AND SAMPLE PREPARATION

Lithium hydroxide and lithium carbonate can be directly analyzed without any sample preparation. For the assay of lithium hydroxide,

it is of importance that the water is free from carbon dioxide, otherwise this would interfere with the titration.

EXPERIMENTAL

Both assays are carried out on an automated system consisting of an OMNIS Sample Robot S and an OMNIS Advanced Titrator equipped with a dEcotrode plus.

After the sample is weighed into the beakers, the dilution and titration of the sample is automatically done by the system. The sample is titrated with hydrochloric acid until after the equivalent point.

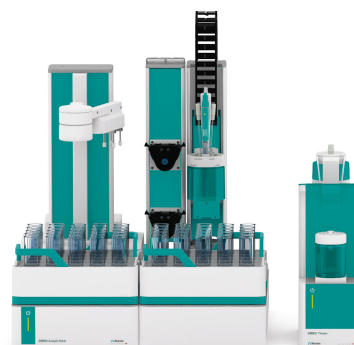


Figure 1. Sample Robot and OMNIS Titrator Advanced equipped with dEcotrode plus for the assay of lithium hydroxide and lithium carbonate.

RESULTS

For both assays, reproducible results with relative standard deviations below 0.4% ($n = 5$) are obtained. Additionally, carbonate impurities

within the lithium hydroxide sample can be detected.

Table 1. Results of the assay of lithium hydroxide and lithium carbonate.

n = 5	Purity of LiOH in %	Purity of Li ₂ CO ₃ in %
Mean	99.20	100.78
SD(abs)	0.24	0.34
SD(rel)	0.24	0.34

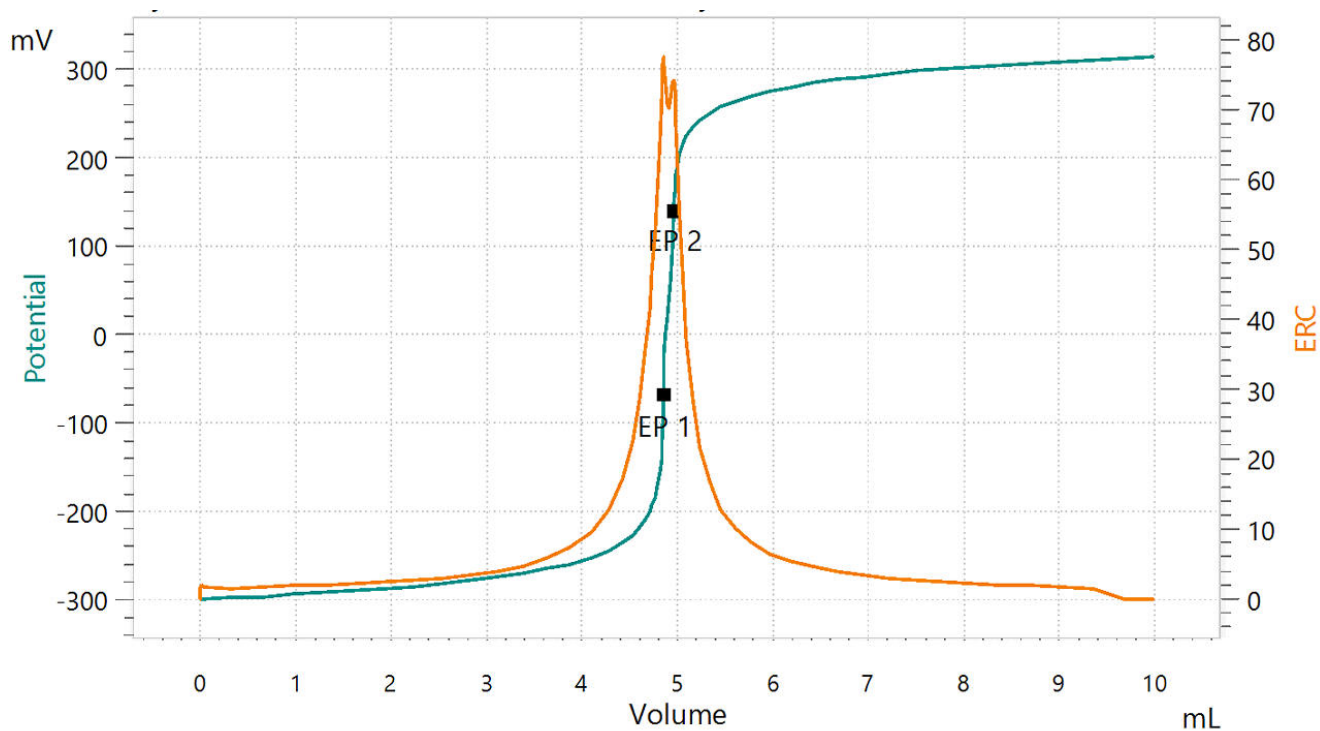


Figure 2. Titration curve of the assay of lithium hydroxide. The second equivalence point corresponds to lithium carbonate impurities.

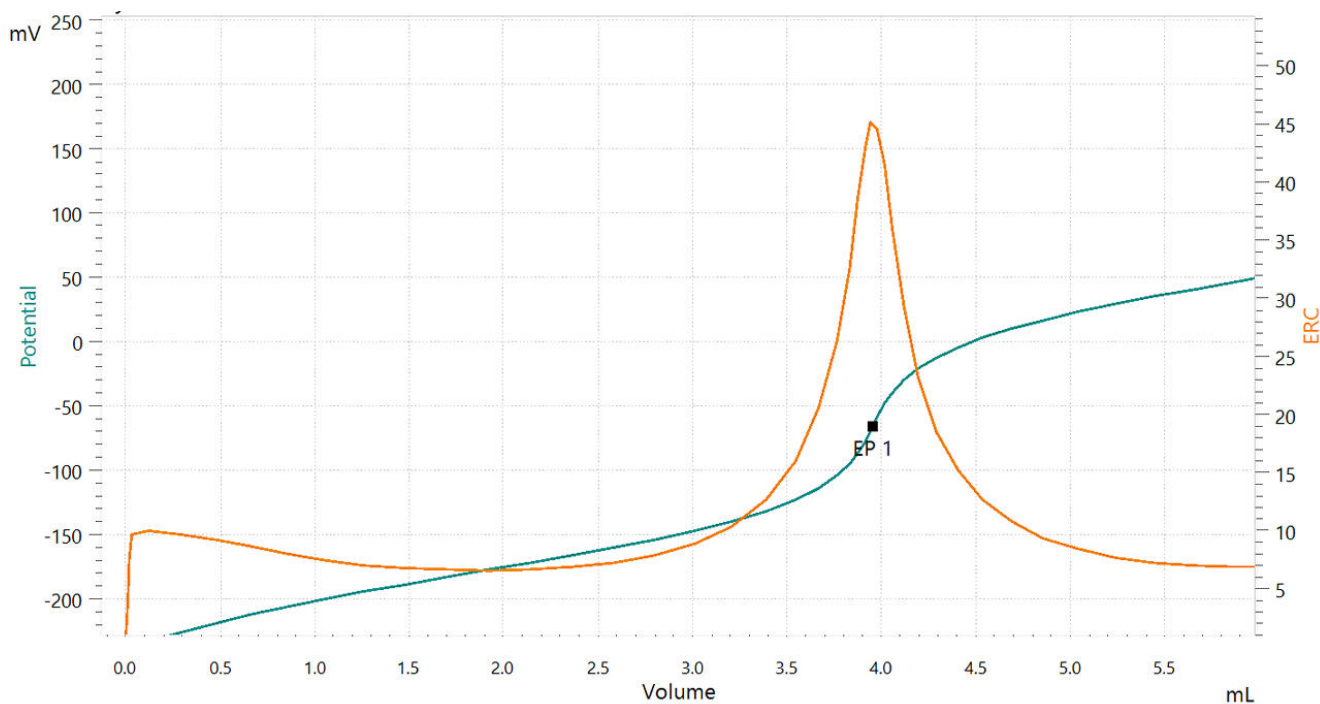


Figure 3. Titration curve of the assay of lithium carbonate.

CONCLUSION

Titration is a precise and reliable method for the assay of lithium hydroxide and lithium carbonate.

Using an automated OMNIS system allows you

to analyze up to four samples simultaneously. The OMNIS system can be customized according to your needs, and expanded for other titration applications required for quality control.

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CONFIGURATION



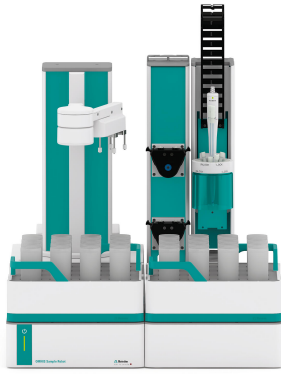
OMNIS Advanced Titrator

创新型、模块式电位分析 OMNIS Titrator 滴定仪,用于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
- 可以扩展磁力搅拌器和/或螺旋搅拌器
- 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 Sample Robot S Pick and Place

OMNIS Sample Robot S 具有一个“蠕动”泵模块(2通道)和一个 Pick&Place 模块以及大量附件,可直接进入全自动滴定。此系统具有两个样品盘位置,可用于 32 个 120 mL 的样品盘。此模块化系统供货时已完全安装完毕,因此可在极短时间内投入运行。

该系统也可根据需要扩展配备另外两台蠕动泵以及多加一个 Pick&Place 模块,由此使通量翻倍。如果需要更多工作台,则可将此 Sample Robot 扩展为 L 规格款型的 OMNIS Sample Robot,由此可使七个样品盘的样品在多达四个 Pick&Place 模块上并行处理,将样品通量扩大四倍。



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。

dTrodes 可在 OMNIS Titratoren 上使用。