



Application Note AN-T-216

Assay of lithium nitrate

Reliable and fully automated determination by potentiometric titration

Lithium nitrate is an oxidizing agent used in the manufacture of red-colored fireworks and flares. In addition, the lithium nitrate trihydrate compound absorbs heat well and can be used for thermal energy storage at its melting temperature of 30 °C.

Lithium nitrate is a hygroscopic substance and therefore the purity needs verification before it is used for synthesis or other applications.

The purity can be easily determined using a fully automated titration system. The assay is done by a precipitation titration between lithium and fluoride in an ethanolic solution. The benefit of titration is that the lithium nitrate does not need to be diluted after dissolving in ethanol as with other techniques such as ICP-MS.

SAMPLE AND SAMPLE PREPARATION

The application is demonstrated on lithium nitrate with a purity of >98%. No sample preparation is

needed.

EXPERIMENTAL

This analysis is carried out on an automated system consisting of an OMNIS Advanced Titrator and an OMNIS Sample Robot S equipped with a fluoride ion selective electrode.

After weighing the sample into the sample beaker, all further steps are automatically carried out by the system. The assay is performed by a precipitation titration with ammonium fluoride in an ethanolic solution.

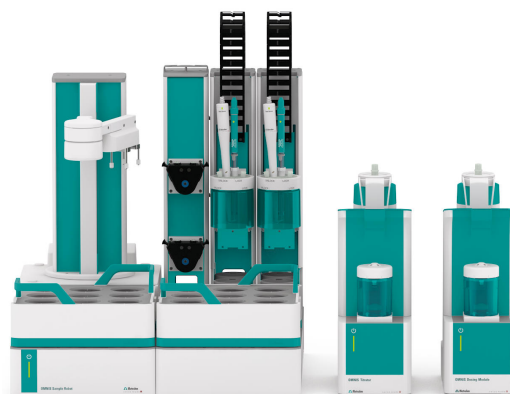


Figure 1. OMNIS Sample Robot, OMNIS Dosing module, and OMNIS Advanced Titrator equipped with fluoride ion selective electrode for the assay of lithium nitrate.

RESULTS

With this method a purity of 100.85% ($n = 5$, $SD(\text{rel}) = 0.45\%$) is determined. This value corresponds to the

theoretical value of $> 98\%$.

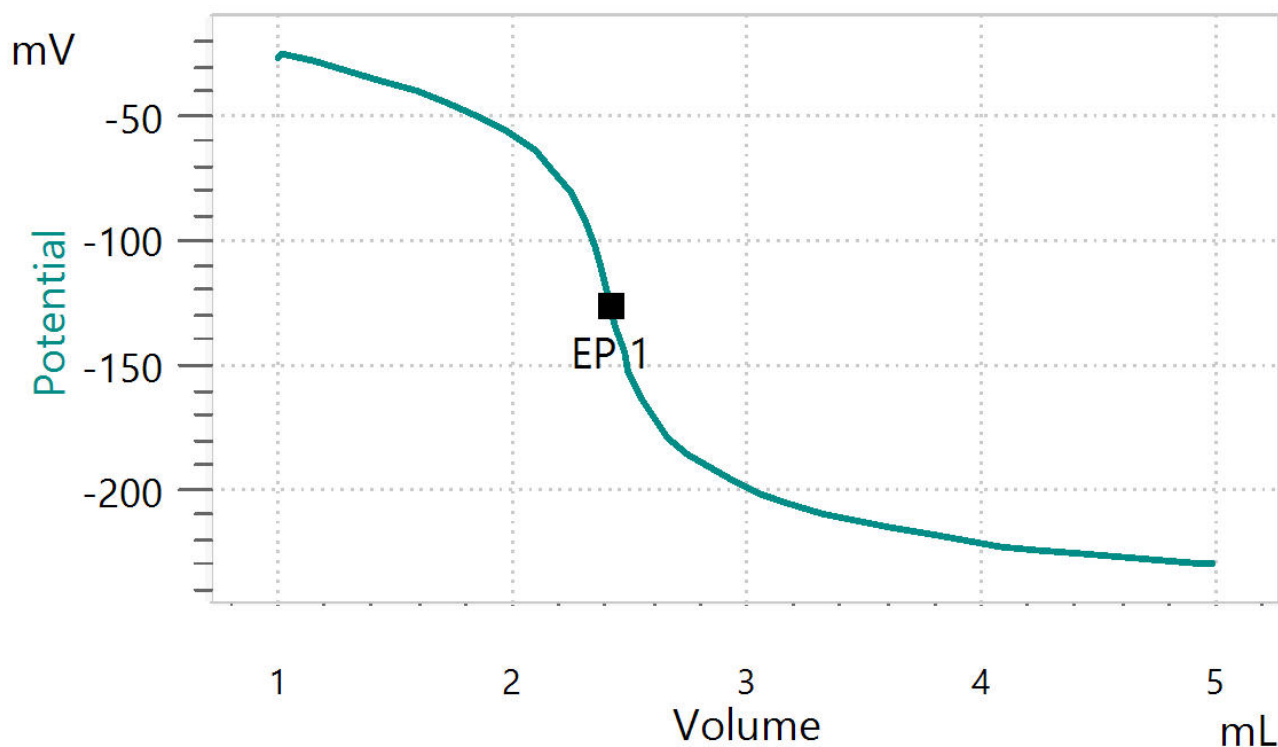


Figure 2. Example titration curve of the assay of lithium nitrate.

CONCLUSION

Titration is a precise and reliable method to determine lithium nitrate. In comparison to other techniques such as ICP-MS, it is not necessary to dilute the lithium nitrate sample, greatly increasing the accuracy of the analysis.

Using an OMNIS Sample Robot allows the fully

automated measurement of up to four samples simultaneously. The OMNIS System offers the opportunity to customize the system according to your needs, and expand it for other required titration applications.

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