Application Note AN-T-181

Lithium in brine

Reliable and inexpensive determination by potentiometric titration

Lithium is a soft metal which is used for many applications, such as production of high-temperature lubricants or heat-resistant glass. Furthermore, lithium is used in large quantities for battery production. It is obtained from brines and high-grade lithium ores. Depending on the lithium concentration, extraction may or may not be economically viable.

This Application Note demonstrates a method to determine the lithium concentration in brines by potentiometric titration. Lithium and fluoride precipitate in ethanol as insoluble lithium fluoride. Using ammonium fluoride as titrant and a fluoride ion selective electrode (ISE), determination of lithium via potentiometric titration is possible.

This method is more reliable, faster, and less expensive than the determination of lithium in brine by other more sophisticated techniques such as atomic absorption spectroscopy (AAS).

SAMPLE AND SAMPLE PREPARATION

Two samples with ~20% (m/m) and ~40% (m/m) lithium chloride are analyzed. No further sample preparation is required.

EXPERIMENTAL

The analysis is carried out with an automated system consisting of *tiamo*™ in combination with a 905 Titrando. A fluoride ion selective electrode (ISE) in combination with a Long Life ISE reference electrode is used for the indication of the titration.

After transferring an appropriate amount of sample into the titration vessel, enough ethanol is added to cover the diaphragm of the electrode. The titration is carried out using ammonium fluoride until after the first equivalence point is reached.

Calcium will interfere with the analysis and has to be analyzed separately.

Figure 1. 905 Titrando with tiamo. Example setup for the analysis of lithium in brine.

RESULTS

For both samples this method gave reliable and reproducible results.

Table 1. Results of the lithium determination in brines.

n = 3	Assay of LiCl brine 1 in %	Assay of LiCl in brine 2 in %
Mean	41.3	14.85
SD(abs)	0.7	0.11
SD(rel)	1.6	0.7

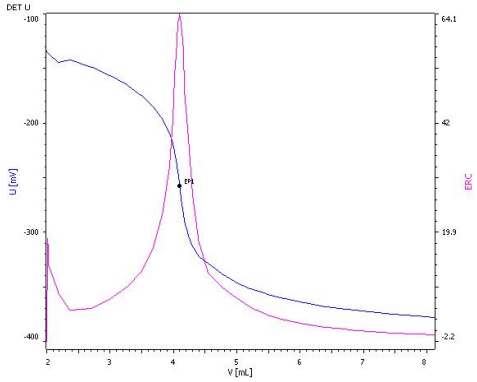

Figure 2. Example curve of the lithium determination in brines.

CONCLUSION

Using ethanol as solvent, ammonium fluoride as titrant, and the fluoride ISE for indication, the determination of lithium in brine can be performed reliably and cost-efficiently.

Therefore, this method provides an inexpensive and simple approach to determine if an extraction of lithium from brine is economically feasible or not.

CONTACT

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CONFIGURATION

907 Titrando

用于使用个量接口和 Dosino 加液元位分析和容量·休滴定法滴定的高端滴定。

- 多四套 800 Dosino 加液系
- (DET)、等量(MET)和点滴定(SET),和 pH-STAT 滴定(STAT)、·休容量滴定(KFT)
- 智能"iTrode"
- 使用子性量(MEAS CONC)
- 控的加液功能,LQH
- 用于其他拌器或加液器系的四个 MSB 接口
- USB 接口
- 使用 OMNIS-Software、*tiamo*-件或 Touch Control
- 如果需要,足 GMP/GLP 和 FDA 要求,比如 21 CFR 第 11 部分

F-ISE Pt1000

合式化物性,集成有 Pt1000 的晶体膜。

ISE 用于:

- F- 的子量(10-6 mol/L 直至和)
- 自化子量
- 滴定

参比解:c(KCl) = 3 mol/L

存放在参比解中。