



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*TM 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

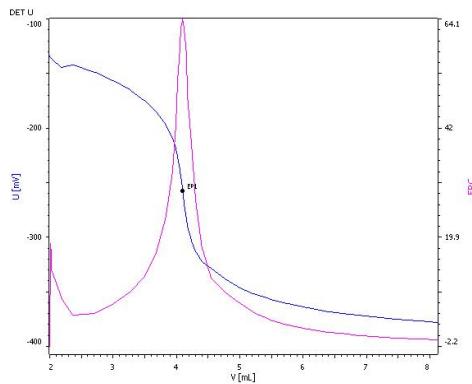


Figure 2. Example curve of the lithium determination in brines.

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.

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CONFIGURATION



907 Titrando

Titreur haut de gamme pour le titrage potentiométrique et volumétrique Karl Fischer avec deux interfaces de mesure et des unités de dosage Dosino.

- jusqu'à quatre systèmes de dosage du type 800 Dosino
- titrage dynamique à point d'équivalence (DET), titrage monotone à point d'équivalence (MET) et titrage à point final (SET), titrages enzymatiques et pH-STAT (STAT), titrage Karl Fischer (KFT)
- électrodes intelligentes « iTrode »
- mesure avec des électrodes ioniques spécifiques (MEAS CONC)
- fonctions de dosage avec contrôle, manipulation des liquides
- quatre connecteurs MSB pour des agitateurs ou des systèmes de dosage supplémentaires
- connecteur USB
- utilisation avec le logiciel OMNIS, *tiamo* ou le Touch Control
- satisfait aux exigences des BPF/BPL et de la FDA, telles que celles de la réglementation 21 CFR Part 11, le cas échéant



F EIS combinée avec Pt1000

Électrode sélective au fluorure combinée à membrane cristalline et capteur de température Pt1000 intégré.

Cette EIS convient aux :

- Mesures ioniques de F- (10-6 mol/L à sat.)
- Mesures ioniques automatisées
- Titrages

Électrolyte de référence : $c(KCl) = 3 \text{ mol/L}$

L'électrode est conservée dans l'électrolyte de référence.