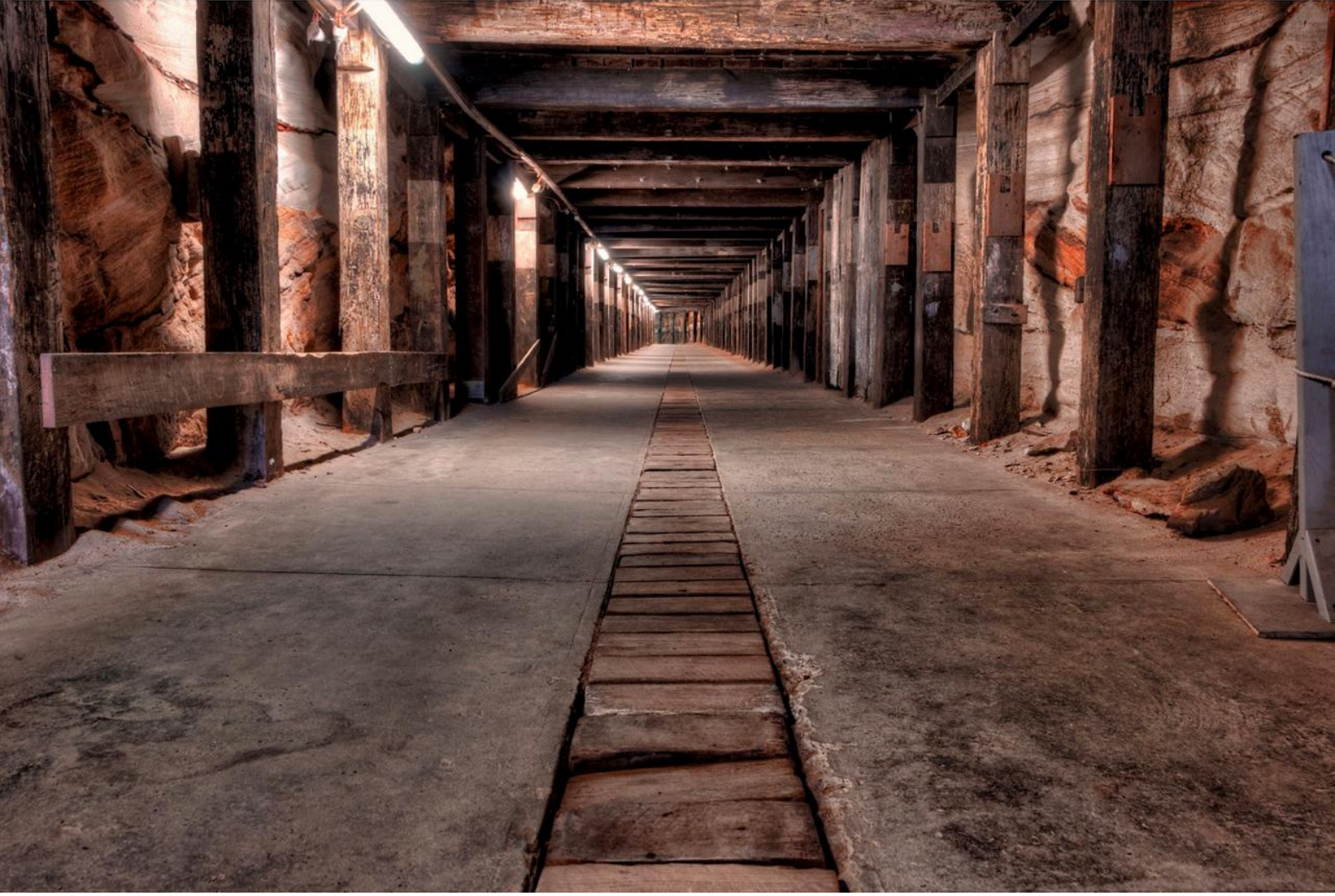

Application Note AN-H-148

Potassium in potash

Rapid and inexpensive determination by thermometric titration

Potash refers to various water-soluble potassium salts, such as potassium chloride or potassium carbonate. Potash is mainly used as fertilizer, providing potassium—an essential nutrient—to plants. Additionally, it is used in the chemical industry and to produce medicine.

Potash is commonly mined from ore, deposited after ancient inland oceans evaporated. The potassium salt is then purified in evaporation ponds. At the end of this process, the potash is typically obtained as potassium chloride.

Historically, potassium is determined by precipitation with sodium tetraphenylboron (STPB). The disadvantage of this gravimetric method is the long waiting time until a result is obtained. Currently, the potassium content in potash is typically determined by flame photometry (F-AES) or ICP-OES. However, these techniques have high investment and running costs.

By applying the gravimetric precipitation reaction as a thermometric titration, it becomes possible to rapidly and inexpensively determine the potassium content in potash within minutes.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on different potash samples as well as pure potassium chloride. No sample preparation is required.

EXPERIMENTAL

The analysis is carried out with an 859 Titrotherm equipped with a Thermoprobe. The titration is based on the precipitation of potassium with sodium tetraphenylboron (STPB).

An appropriate amount of sample is weighed precisely into the titration vessel. Deionized water is added to dissolve the sample, which is then titrated until after the exothermic endpoint with standardized STPB is reached.

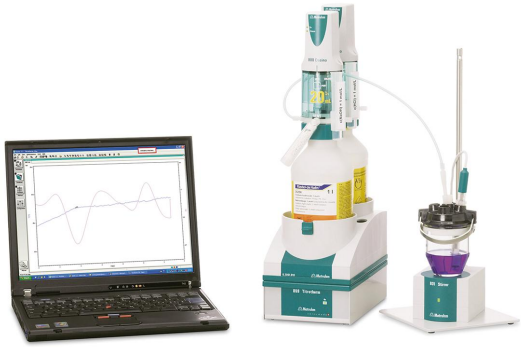

Figure 1. 859 Titrotherm setup for the thermometric titration and the data evaluation performed with tiamo.

RESULTS

Reproducible titration curves with clear exothermic endpoints are obtained. One exemplary titration curve is shown in Figure 2. Table 1 shows a summary of the results for different potash samples. As can be seen, all values agree well with the expected content.

Table 1. Results of the thermometric titration of potassium in potash expressed as potassium chloride and pure KCl (n = 3). The expected potassium content of the potash samples is given in parentheses next to the sample name.

	Potassium / % KCl	SD(rel) / %
KCl	99.95	0.31
K419 (95.98%)	95.98	0.24
K422 (95.09%)	94.96	0.10
K423 (98.89%)	98.93	0.11

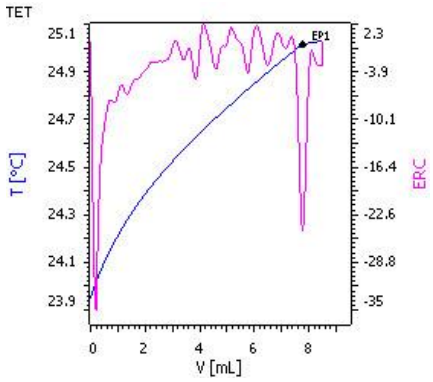

Figure 2. Titration curve of thermometric determination of potassium in potash by precipitation titration with STPB.

CONCLUSION

Thermometric titration is a very fast and accurate method to determine the potassium content in potash within minutes. Additionally, it provides an inexpensive alternative analysis method in comparison to F-AES or ICP-OES.

Internal reference: AW TI CA1-0155-112014

CONTACT

Metrohm Vietnam
Phan Dinh Giot
70000 Herisau
info@metrohm.vn

CONFIGURATION

859 Titrotherm complete with tiamo™
Computer-controlled titrator for thermometric titration. Including complete accessories for the titration (10 mL buret, titration stand with rod stirrer, Thermoprobe, titration vessel and tiamoTM light).