Method Summary

Determination of Electrical Conductivity in Soil Samples

Scope and Range

This is a quantitative analysis to determine electrical conductivity
Range: 0 - 101 $mScm^{-1}$ at 20°C
Method Detection Limits: 0.014 $mScm^{-1}$ at 20°C

References

Standard Methods for the examination of waters and wastewaters 16th Edition, PHA, Washington DC, USA. ISBN 0-87553-131-8.
The measurement of Electrical Conductivity and the Laboratory Determination of the pH value of Natural, Treated and Waste Waters. HMSO, 1978. ISBN 011 751428 4.
BS 3882: 1994. ISBN 0 580 23406 1.
MAFF/ADAS Reference Book 427. ISBN 0 11 242762 6.

Principle

Electrical conductivity is a measure of the ability of a solution to allow the flow of electrical current.
It is measured by determining the A.C. voltage produced between inert electrodes of fixed dimension when a constant A.C. current is applied.

In solution, conductivity is dependent on the number and type of ions in present. The conductivity / concentration relationship is, however, non-linear and is very temperature dependent (e.g. about 2% increase in conductivity per °C for potassium chloride solution). Because of the non-linear relationship between conductivity and concentration, it is not possible to dilute or concentrate samples before measurement.

Because of the high temperature dependence, electrical conductivity is quoted at a fixed reference temperature of 20°C. The temperature dependence for potassium chloride solution is well known, allowing instruments which incorporate combined temperature / conductivity probes to calculate or estimate a correction for standards and samples measured at temperatures other than the reference temperature. The temperature correction for real samples may not be close to that of potassium chloride, and for accurate determination of conductivity, samples should be brought close to the reference temperature (within ±1°C of the reference temperature).

Preparation and Analysis:
Soluble salts, other than calcium sulphate are extracted from soil with saturated calcium sulphate solution and filtered before analysis.
The Conductivity of the extract is measured using the EC meter.

Quality Control:
The cell constant as determined after each full calibration should differ by no more than 10% from the nominal cell constant printed on the probe, and by no more than ± 3 standard deviations from the mean of the most recent recorded system suitability data.

A Check standard is run with every 20 samples

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Interferences

Samples of low ionic strength may exhibit erratic conductivity readings due to exchange of CO_2 and other gases with the atmosphere