

METHOD STATEMENT

Determinand:

Redox Potential (E_h).

Ideally, this analysis should be carried out at the sampling site.

Matrix:

Leachates, effluents, wastewaters and potable water

Principle of Method:

The redox potential of a sample (also called ORP or Oxidation-Reduction potential) provides an indication of the behaviour of chemicals within the sample, offering information on reactivities and mobilities of the major species within the sample.

Measurements are made using an electrode attached to a mV meter. The mV result obtained is corrected for system variabilities by direct comparison with a suitable Redox reference standard.

This is an empirical method and the mV values obtained are dependent on the electrode assembly and operating conditions. Different electrode assemblies, filling solutions, temperatures etc. will alter the redox values obtained. This method uses a silver:silver chloride electrode filled with 3M potassium chloride, with standardisation and analysis carried out at room temperature.

Sampling and Sample Preparation:

Ideally, the redox potential of the sample should be measured on site.

If this is not possible, then samples can be collected in either glass or plastic bottles with a volume not less than 100ml. Care should be taken to ensure a minimum headspace. A glass 250ml stoppered bottle is particularly suitable for this type of sampling.

There is no preservative suitable for redox potential, so the sample should be analysed as soon as possible at the laboratory. If samples have been refrigerated, analysis must not be started until a stable room temperature is attained.

Interferences:

Samples should be measured on-site, as transportation and delays in analysis can allow changes within the sample to occur that result in different redox readings.

The method is temperature sensitive. All standards, samples and AQC solutions should be at room temperature to ensure a rapid stabilisation of the millivolt reading.

Contamination of the electrode can give rise to false results. The electrode must be clean and in good working order.

The wrong type of electrode can give false results. The E_h values for the standards are specific not only to the type of electrode used, but also to its filling solution. Care must be taken to ensure the specified electrode assembly is used.

Performance of Method:

Range of Application: Not Applicable

Limit of Detection: Not Applicable

Normal Reporting Level: Not Applicable



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	250mV Check	400mV Check	ZoBell 228mV
Value mV	248.60	391.55	228.10
Total Standard Deviation, mV	5.42	6.23	3.66
Bias, %	-0.56	-2.11	+0.04
Uncertainty, %	4.9	5.2	3.3

	Potable Water	Groundwater	Wastewater	Effluent	Leachate
Value mV	200.56	202.07	187.43	207.72	-78.08
Total Standard Deviation, mV	11.82	7.29	9.75	8.99	4.31

References:

Thermo Electron Corporation – Orion Star Series Meter User Guide. Chapter XI ORP Techniques.

Standard Methods for the Examination of Water and Wastewater – 20th Edition. Ref 2580: Oxidation – Reduction Potential. ISBN 0-87553-253-7

