



Analysis of Perchlorate by LC/MS

Perchlorate is an emerging environmental contaminant of concern and a known endocrine disruptor that affects thyroid activity. The Perchlorate anion is very water soluble, highly inert and stable. As a result, once it makes its way into groundwater systems, it is extremely persistent and mobile and no cost-effective remediation strategies currently exist to remove it from groundwaters. ALS is now able to offer the analysis of perchlorate in both water and soil matrices to trace levels. Further information follows.

Background on Perchlorate

Perchlorate is a known endocrine disruptor that inhibits the normal function of the thyroid gland by interfering with the uptake of iodide, needed for the synthesis of thyroid hormones. These hormones are essential to normal growth, development and metabolism in humans, and in particular for infants.

Perchlorate salts are used in a variety of industrial, manufacturing and defence processes. Due to the stability and high oxygen content of these compounds they are generally used as an oxidiser for rocket fuel propellants, fire works, flares, munitions, explosives and air bag inflators. Perchlorate has also been used as a medication to treat hyperthyroidism since the 1950's.

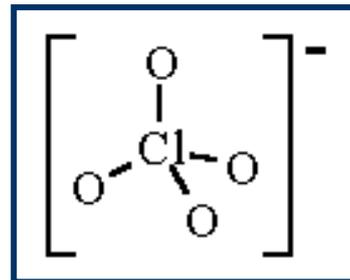


Drinking Water Standards

Whilst there are currently no regulated levels in Australia, Perchlorate has been identified as a drinking water contaminant in the USA and has been found at levels greater than 4µg/L in 4% of their public water systems as well as food products such as lettuce crops and cows milk, possibly from use of contaminated irrigation water and feed. The US EPA has established a Drinking Water Equivalent Level (DWEL) for Perchlorate of 24.5µg/L however has not yet set an official standard. The Massachusetts Department of Environmental Protection (MassDEP) has circulated a Maximum Contaminant Level (MCL) of 2µg/L. California has also introduced a drinking water standard of 6µg/L and set an action level for ground waters at 4µg/L.

Chemistry

Chemical:	Perchlorate
CAS Number:	7601-90-3
Formula:	ClO_4^-



Method Scope and LORs

Whilst Perchlorate can be analysed to higher level Limits of Reporting (LORs) using traditional IC methodologies, ALS employs specialist LC/MS technologies. This procedure is based on USEPA Method 6850, which is highly sensitive and less prone to matrix interferences as it uses ion ratios for positive confirmations.

This method has been designed with due consideration to best practice and international guidelines and is currently pending NATA accreditation. The ALS LOR of 0.2µg/L in water will provide confidence well below international limits in the absence of any current domestic standards. This method therefore needs to be considered as an ultra trace method.

Sample Containers and Holding Times

Water samples requiring Perchlorate analysis should be field filtered to 0.2µm and submitted in a chilled unpreserved 60mL clear plastic HDPE bottle. Perchlorate analysis in soil requires a chilled unpreserved 150mL glass jar as a minimum. Holding times for both soils and waters are 28 days.

For further details, please contact ALS Sydney on (02) 8784 8555 or your local ALS Client Services Team.

References:

- (1) Frequently Asked Questions – Perchlorate
<http://www.mass.gov/dep/toxics/pchlorqa.htm>
- (2) Addressing Perchlorate and Other Emerging Contaminants in Massachusetts
<http://www.mass.gov/dep/water/drinking/percfs77.htm>
- (3) Perchlorate
<http://en.wikipedia.org/wiki/Perchlorate>
- (4) <http://www.epa.gov/OGWDW/contaminants/unregulated/perchlorate.html>
- (5) ALS Enviro Notes – Spring Issue 2008: Perchlorate: Hidden Danger or Idle Threat

For further information on specialist Services please visit the ALS website: www.alsglobal.com