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THE DETERMINATION OF METALS BY THE PBET TEST

INTRODUCTION

Soil Guideline Values are published by the Environment Agency and are considered to be appropriate generic assessment criteria for soils. It is argued that contaminants in some soils may be absorbed differently by humans thus over or under-estimating the health risk posed from ingestion. Assessing the bioaccessible fraction of contaminants in a soil is a possible method available to refine the risk assessment of contaminated land.

Results from PBET analysis can be compared to Health Criteria Values (HCV) where available.

Note: Total metal analysis is UKAS accredited, PBET analysis is not accredited.

PRINCIPLE

Extraction follows the human digestive process to determine what percentage of a potentially toxic metal (e.g. Arsenic) is absorbed in the human digestive system and from where.

The parts of the digestive system that are simulated are the stomach and small intestine.

The stomach is represented by a pH 2.5 solution whilst the small intestine is represented by a pH 7 solution.

PBET extraction commences at time 0 minutes with ground sample at pH 2.5.

Representative aliquots are taken at 20 mins, 40 mins and 60 mins.

Once the 60 mins aliquot has been taken, the pH of the solution is adjusted to pH 7. An aliquot is then taken 120 mins from Time 0 and then the final aliquot at 240 mins.

Aliquots are then extracted and analysed by ICP - OES, reported as mg / kg and calculated as a percentage of the total metal concentration.

PERFORMANCE CHARACTERISTICS

SUBSTANCES DETERMINED

Arsenic, Cadmium, Chromium, Mercury, Nickel, Selenium as standard

LIMIT OF DETECTION

Soil samples : 5mg / kg and calculated as % of total metal

ANALYTICAL QUALITY CONTROL

Analysis of control samples within each analytical batch, such as method blanks and calibration standards



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REFERENCES

- Drexler, J.W., and Brattin, W., 2007. An in vitro procedure for estimation of lead relative bioavailability: with validation. *Human and Ecological Risk Assessment*. 13(2), pp. 383-401
- Ruby, M.V., Davis, A., Schoof, R., Eberle, S. and Sellstones, C.M., 1996. Estimation of lead and arsenic bioavailability based extraction test. *Environmental Science and Technology*, 30, pp. 422-430