

APPLICATION NOTE

T2O-AN-101

CADMIUM, LEAD METHOD

The following application note explains the procedure for the detection of Cadmium and Lead using the HM1000 Metalyser[®].

PLEASE READ THIS APPLICATION NOTE CAREFULLY. TRACE2[®] HAS ALTERED THE NAMES OF SOME REAGENTS FOR SIMPLICITY AND SO THE PROCEDURE MAY BE DIFFERENT FROM THAT FOLLOWED PREVIOUSLY.

Equipment:

- **HM1000 Kit**
- **HM1 Buffer** (Previously M1&4(a+b) Buffer sachets)
- **CP50 Cd, Pb standard** (Previously M1 Standard (5ppm))
- **HG500 Hg Plating Solution** (Previously M1,4,5 Conditioning Solution)

Electrode conditioning:

- Polish WE1 Electrode to a mirror finish and perform a visual check to ensure that no scratches or scuffs are present.
- Half-fill the sample analysis beaker (SAB) with **HG500 Hg plating solution** and fit to the Sonde.
- Select 'M1,4,5 Conditioning' from the 'Test Methods' menu then select 'Condition Electrode'.
- The M1,4,5 conditioning step will take approximately 5 minutes.
- Once completed, return the **HG500 Hg plating solution** to the **HG500 Hg plating solution** bottle and rinse the Sonde and SAB with the Electrode Rinse Solution and/or deionised water.

Sample preparation:

- Add **two sachets of HM1 Buffer** to the SAB.
- Add 70ml of sample water to the SAB, either by adding a measured volume or by fitting the SAB to the Sonde and submerging in the water source until the bubbles stop.

There are two methods for carrying out the analysis. The single-point standard addition is the recommended option, and uses two data points to calculate concentration. The calibration option is designed for rapid analysis of several samples with a similar matrix (i.e. several samples from different points along the same river bank).

Analysis (single-point standard addition method)

- Fit the SAB to the Sonde (If not using submersion method).
- Select 'Cd,Pb' from the 'Test Methods' menu, then select 'Condition Electrode' and wait approximately two minutes for it to complete.
- Select 'Standard Addition' in the analysis panel. Wait approximately two minutes until prompted to add 20ppb of the standard. When prompted use the pipette to add 280µL of the **CP50 Cd, Pb standard** into the SAB and click 'OK'. The analysis will continue to run for approximately two further minutes after which the results will be displayed.

Result (single-point standard addition method)

- The result(s) are shown in the instrument display until 'Ok' is clicked. Following this the user will be given the option of saving the ppb results into the results log. The most recent scan can be viewed graphically in 'Data log', 'Last result'. The graph displayed is that of the scan after the standard addition, and is intended for diagnostic purposes only. If Cd and or Pb has been detected the peaks will be identified as Cd and Pb and will be marked up as such. The original sample concentration will be reported in ppb.

Analysis (calibration method)

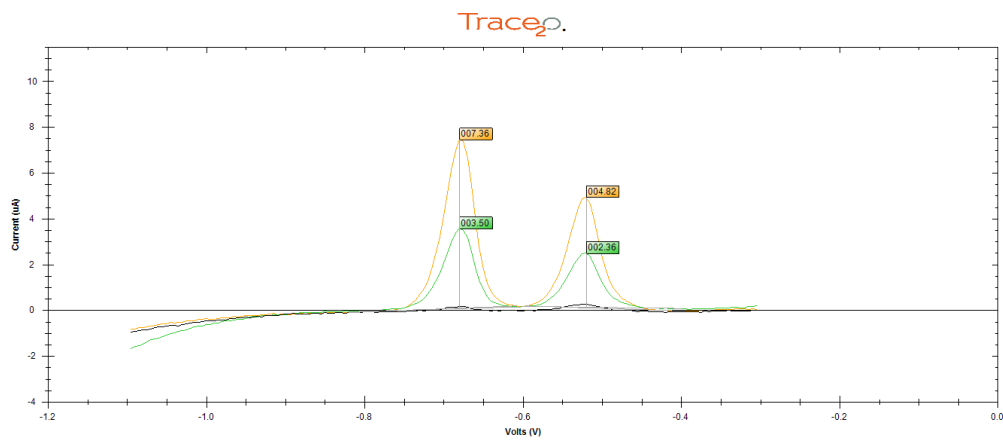
- Fit the SAB to the Sonde.
- Select 'Cd,Pb' from the 'Test Methods' menu, then select 'Condition Electrode' and wait approximately two minutes for it to complete.
- Select 'Calibration'. Wait approximately two minutes until prompted to add 20ppb of the standard. When prompted use the pipette to add 280µL of the standard into the SAB and click 'OK'. The analysis will continue to run for approximately two further minutes until prompted to add another 20ppb of standard. Repeat the addition process and click 'ok'. The analysis will run for another two minutes before completing the calibration.
- Once the calibration has been completed several consecutive analyses can be carried out.
- Select 'Analyse Sample' and wait approximately two minutes for the analysis to complete.

Result (calibration method)

- The result(s) are shown in the instrument display until 'Ok' is clicked. Following this the user will be given the option of saving the ppb results into the results log. The most recent scan can be viewed graphically in 'Data log', 'Last result'. The graph displayed is intended for diagnostic purposes only. If Cd and or Pb has been detected the peaks will be identified as Cd and Pb and will be marked up as such. The original sample concentration will be reported in ppb.

Graph

- Cadmium appears as a sharp peak at around -0.67V. Lead appears as a sharp peak at around -0.50V.



LOD

- The Lower LOD for Cadmium is 3ppb, the Lower LOD for Lead is 5ppb; upper LOD is 500ppb.
- To increase the range the sample can be diluted using Ultra-pure de-ionised water. Other water types could introduce contamination.

Interferences

- High levels of Thallium in the sample water may affect the quality of the analysis.
- Solutions are available for combating interferences in the sample. These may be specific to particular water types or conditions. For further information, please contact Trace2o® Technical Support department – technical@trace2o.com