

ARSENIC (III + V) METHOD

The following application note explains the procedure for the detection of Arsenic (III) and Total Arsenic using the HM2000 Metalyser[®]. Total Arsenic can be measured by the addition of hydrochloric acid which is not supplied as standard.

PLEASE READ THIS APPLICATION NOTE CAREFULLY. TRACE2O[®] HAS ALTERED THE NAMES OF SOME REAGENTS FOR SIMPLICITY AND SO THE PROCEDURE MAY BE DIFFERENT FROM THAT FOLLOWED PREVIOUSLY.

Equipment:

- **HM2000 Kit**
- **HM3 Buffer** (Previously M3 Buffer sachets)
- **AS50 As standard** (Previously M3 Standard (5ppm))
- **AU500 Au Plating Solution** (Previously M2&3 Conditioning Solution)
- **HMHCLAS Hydrochloric Acid** (Only required for total As – Supplied separately)

Electrode conditioning:

- Polish WE2 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 **AU500 Au Plating Solution** and fit to the Sonde.
- Select 'M2&3 Conditioning' from the 'Test Methods' menu then select 'Condition Electrode'.
- The M2&3 conditioning step will take approximately 5 minutes.
- Once completed, return the **AU500 Au Plating Solution** to the **AU500 Au Plating Solution** bottle and rinse the Sonde and SAB with the Electrode Rinse Solution and/or deionised water.

Analysis procedure for Arsenic (III)

Sample preparation:

- Add **one sachet of HM3 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, using 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 'As (III)' from the 'Test Methods' menu, then select 'Condition Electrode' and wait approximately two minutes for it to complete.
- Select 'Standard Addition'. Wait approximately two minutes until prompted to add 20ppb of the standard. When prompted use the pipette to add 280µL of the **AS50 As 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 As has been detected the peak will be identified as As and will be marked up as such. The original sample concentration will be reported in ppb.

Analysis (calibration method)

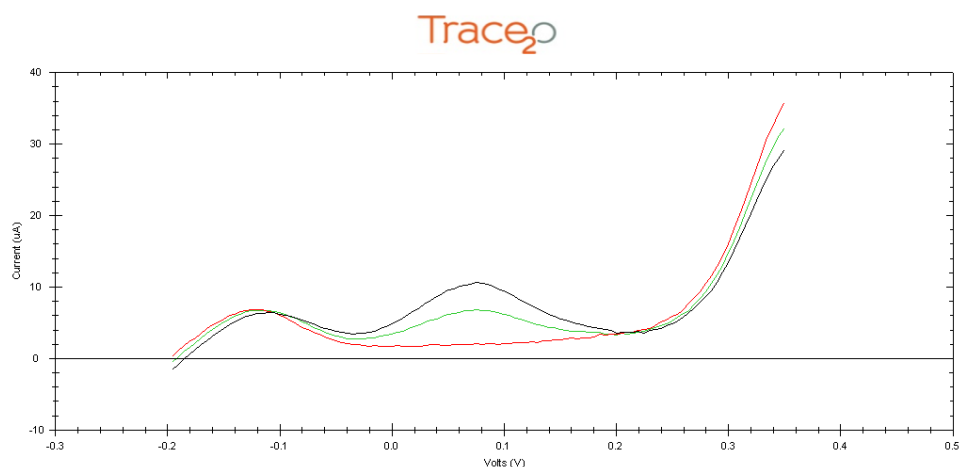
- Fit the SAB to the Sonde.
- Select 'As (III)' from the 'Test Methods' menu, then select 'Condition Electrode' and wait approximately two minutes for it to complete.
- Select 'Calibration'. Wait approximately two minutes until prompted to add 20ppb of the standard. When prompted use the pipette to add 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 As has been detected the peak will be identified as As and will be marked up as such. The original sample concentration will be reported in ppb.

Graph

- Arsenic appears as a broad peak centred around 0.05 and 0.1V. Peak will appear to the left and right of the arsenic, as shown – this is as a consequence of unavoidable contaminants in the buffer. These contaminants do not affect the result in any way.



LOD

- The Lower LOD 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.

Analysis method for Total Arsenic

Sample preparation:

- Add 67ml of sample water to the SAB. Either by adding a measured volume or by fitting the SAB to the Sonde and submersing in the water source until the bubbles stop.
- Add 3ml of **HMHCLAS Hydrochloric Acid** to the SAB. The acid functions as the buffer, and oxidising agent in coordination with the Metalyser®. There is no need for an HM3 Buffer sachet.

Analysis Method:

- Follow the procedure for Arsenic (III), but select As (III+V) from the "Test Methods" menu in place of Arsenic(III).

Results :

- If a result for Arsenic (V) is required, Arsenic (III) analysis can be carried out, followed by Arsenic (III+V) analysis. The result for Arsenic (V) can be found by subtracting the Arsenic(III) result from the Arsenic (III+V) result.