

APPLICATION NOTE

T2O-AN-107

CHROMIUM (VI) METHOD

The following application note explains the procedure for the detection of Hexavalent Chromium using the HM1000 Metalyser®.

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:

- **HM1000 Kit**
- **Windows PC running Metaware software**
- **Chromium electrode**
- **Chromium electrode cutter**
- **Cr (VI) Sample Beaker**
- **AU1000 Au Plating Solution** (Previously M7 Conditioning Solution)
- **EP1 Electrode Preparation Solution** (Previously M7 Electrode Preparation Solution)
- **HM6 Buffer** (Previously M7 Buffer)
- **CR45 Cr (VI) standard** (Previously M7 Standard (4.5ppm))

Getting started:

- Connect the Metalyser instrument to the PC using the USB cable and Metaware software.
- Detailed instructions for establishing a connection, loading drivers and installing software are provided in the Trace2o HM1000 Portable Instruction Manual.

Electrode conditioning:

- Insert the chromium electrode into the electrode cutter as shown and squeeze the handle to cut a small disc from the end of the electrode.



- Connect the chromium electrode to the 'WE3' port on the sonde. Remove the WE1 and WE2 electrodes.
- Empty the contents of the **AU1000 Au Plating Solution** bottle into the Cr (VI) Sample Beaker and attach to the sonde.
- On the Metaware software, select 'M7 Conditioning' from the 'Measurements available' menu, then select 'Condition Electrode'.
- The M7 conditioning step will take approximately 2 minutes.
- Once complete, the Metaware will display 'All done'. Select 'OK'.
- Once completed, return the conditioning solution to the **AU1000 Au Plating Solution** bottle and rinse the Sonde and SAB with the Electrode Rinse Solution and/or deionised water.

Electrode preparation:

- Empty the contents of the **EP1 Electrode Preparation Solution** bottle into the Cr (VI) Sample Beaker and attach to the sonde.
- On the Metaware software, select 'M7 Preparation' from the 'Measurements available' menu, then select 'Condition Electrode'.
- The M7 electrode preparation step will take approximately 2 minutes.
- Once complete, the Metaware will display 'All done'. Select 'OK'.
- Once completed, return the electrode preparation solution to the **EP1 Electrode Preparation Solution** bottle and rinse the Sonde and SAB with the Electrode Rinse Solution and/or deionised water.

Sample preparation:

- Using the supplied syringe, add 7mL of **HM6 Buffer** to the Cr (VI) Sample Beaker.
- Add 63mL of sample water, either by using a measured volume or by filling the sample beaker to the bottom of the void on the side of the sample beaker.
- Attach the sample beaker to the sonde.

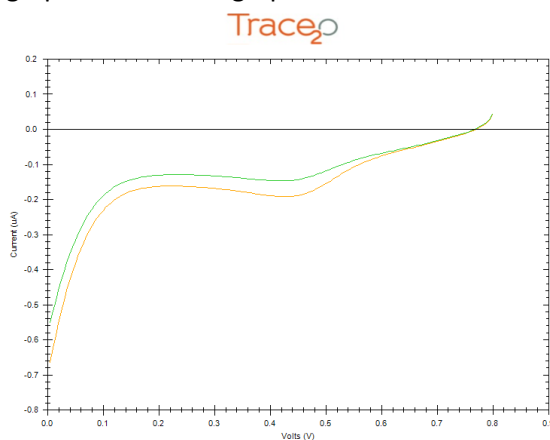
Unlike other parameters, there is only one method for carrying out the analysis. The single-point standard addition uses two data points to calculate concentration.

Analysis:

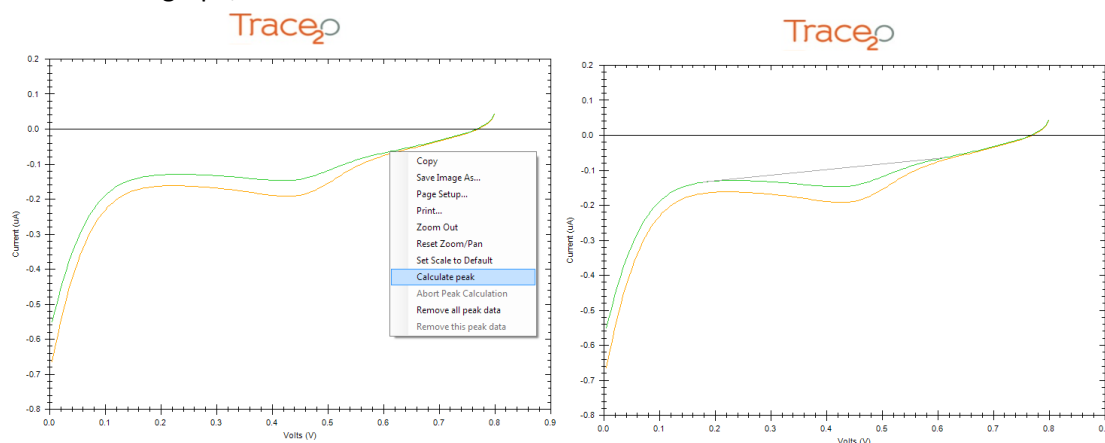
- On the Metaware software, select 'Cr (VI)' from the 'Measurements available' menu.
- Ensure that 'Background subtraction' is unchecked on the 'Control' panel.
- Select 'Standard Addition'. Wait approximately two minutes until prompted to add 20ppb of the standard. When prompted use the pipette to add 280uL of the **CR45 Cr (VI) standard** into the SAB and click 'OK'. The analysis will continue to run for approximately two further minutes, after which two graphs will be displayed in the Metaware window.

Results:

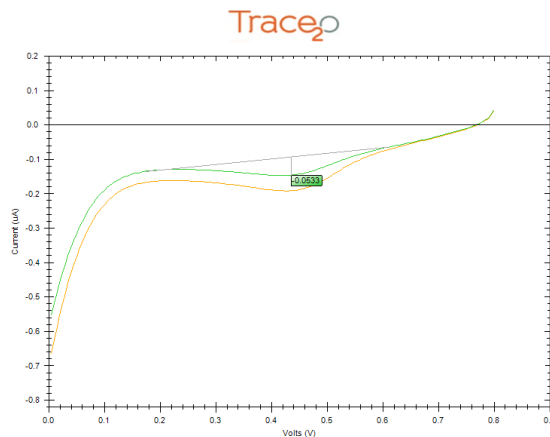
- The graphical data will be displayed. Cr (VI) appears as a distinct trough in the centre of the graph. The second graph will show a noticeably deeper trough. These are called the 'peaks'.



- To determine the original sample concentration, the peak heights must be determined.
- Examine the first graph and identify the 'baseline'. This is an imaginary line drawn from the highest point on one side of the trough, to the highest point on the other side of the trough.
- Right-click on one of the points where the imaginary 'baseline' intersects with the graph. Select 'Calculate Peak', and drag the mouse to the other point where the baseline intersects with the graph, and left-click once.



- The baseline should now be drawn on the graph, and the peak height should be displayed.



- Repeat the peak height determination process with the second graph.
- Using the Excel Peak Height Calculator file provided on the CD, enter the first peak height (without +/- sign) where directed and the second peak height (without +/- sign) where directed.
- If the standard addition concentration has varied, enter this where directed.
- The Peak Height Calculator will now display the original sample concentration in ppb.
- The 'Open Files' panel in Metaware will display the date, time and sample water temperature. There is the option to input sample information. Right-click on the individual lines in the 'Open Files' panel and select 'Update Comments' to add information to the file.
- To save the data, select the individual line in the 'Open Files' panel, then click on the 'File' menu and select 'Save Data File'. Navigate to the chosen location and click 'save'.
- The data file will be saved in CSV (comma separated value) format and can be loaded back into Metaware by selecting 'File', then 'Open Data File'.

LOD:

- The Lower LOD is 50ppb; upper LOD is 500ppb.
- To increase the range beyond the upper limit, the sample can be diluted using Ultra-pure de-ionised water. Other water types could introduce contamination.

Notes:

- It is vital to ensure that the correct version of the instrument Firmware is installed.
- It is vital to ensure that the correct version of the Metaware is installed on the PC.

Interferences

- 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