

DatLab 8.0: CV-Manual

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DatLab 8.0: Cyclic voltammetry manual



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DatLab 8.0: CV

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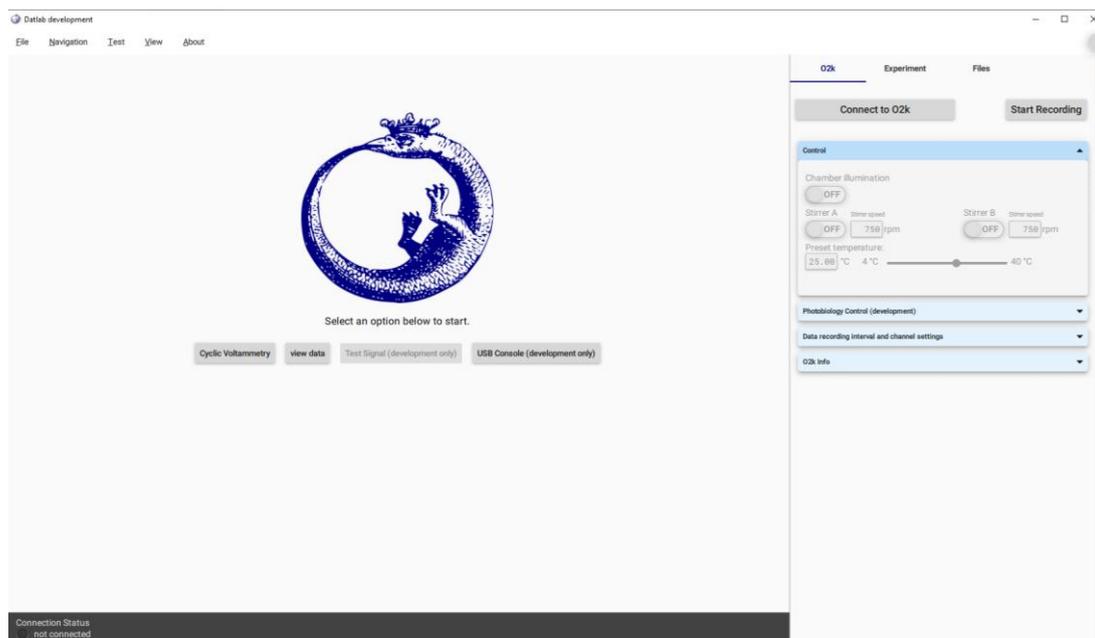
Overview

Integration of Q-redox monitoring in the NextGen-O2k extends the analytical and diagnostic power of high-resolution respirometry. The DatLab 8.0: CV-Module is the next step in high-resolution respirometry (HRR) incorporating user-friendly features for cyclic voltammetry (CV) as a part of the Q-Module. CV is a type of electrochemical measurement, applied as a quality control step to determine the redox potential of coenzyme Q2. In voltammetry, information about the analyte is obtained by measuring the current as the electric potential varies. In CV the electric potential ramps linearly versus time in cyclical phases and is measured between the glassy carbon electrode (GCE) and the Ag/AgCl electrode while the current is detected between the GCE and the platinum electrode. The detected current is plotted versus the applied voltage (GCE's potential) to give the typical cyclic voltammogram trace.

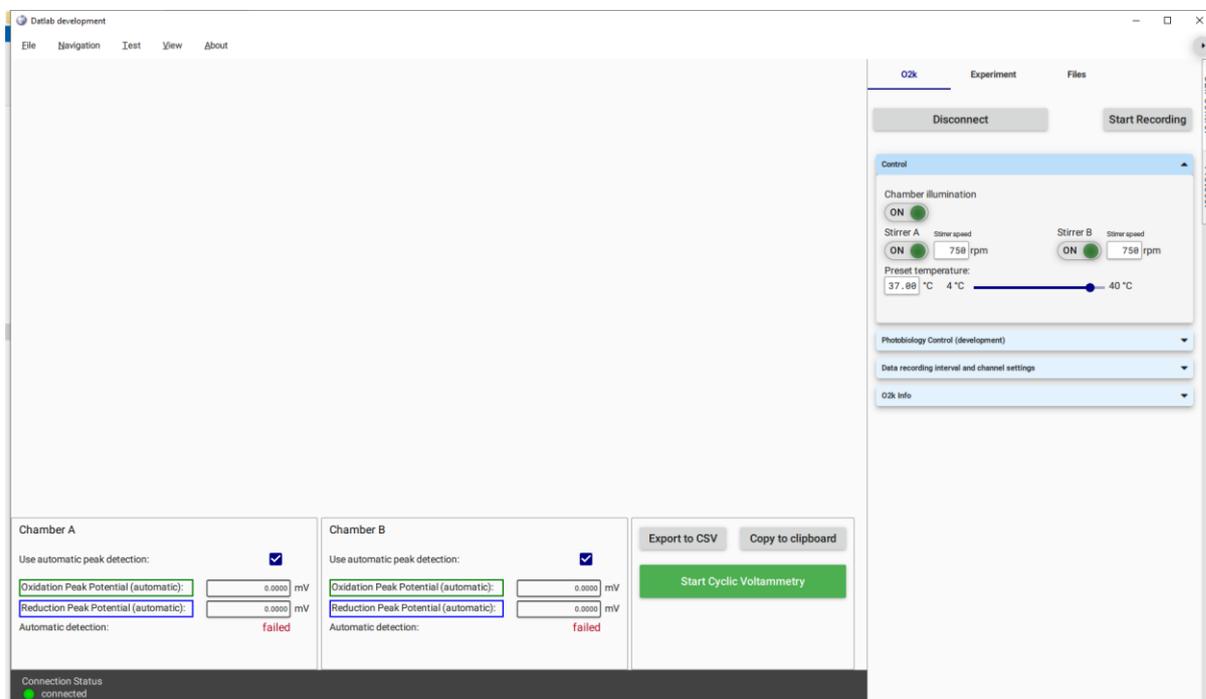
1. Start DatLab 8.0 for cyclic voltammetry

1.1. How to start the measurement?

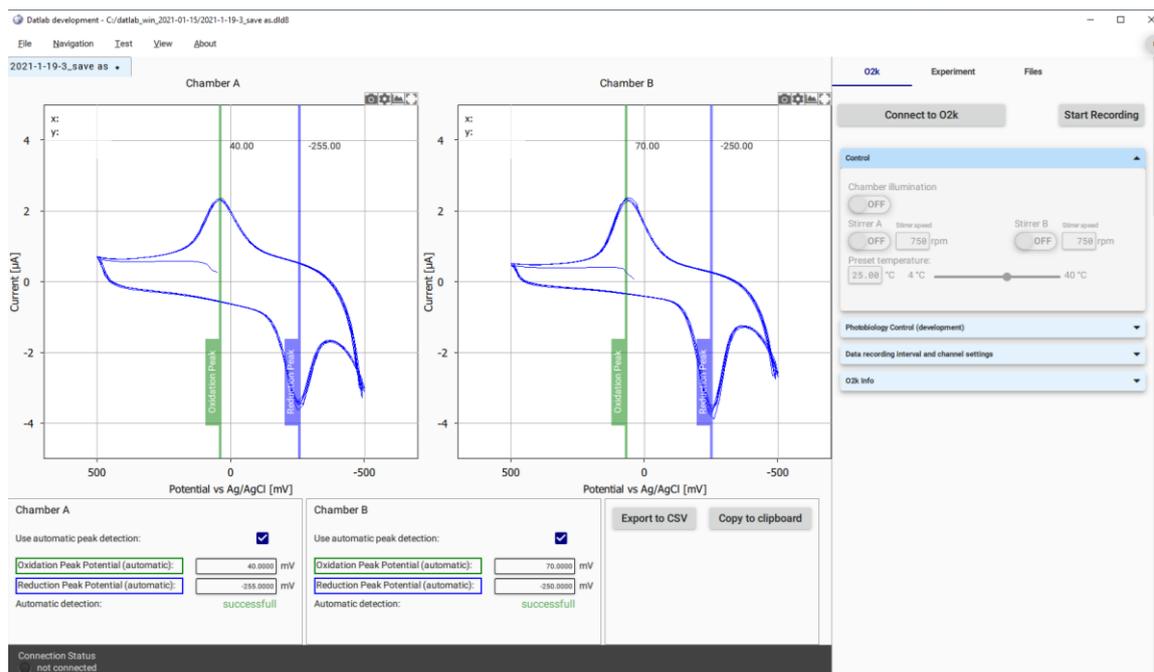
- a) Install the software: unzip the DatLab 8.0 CV folder.
- b) Click on `datlab.exe` to launch the software.



- c) In the starting window of DatLab 8.0 click on **Connect to O2k** in the side menu.
- d) Set the desired temperature in the side menu.
- e) Click on **Cyclic Voltammetry** in the middle of the screen to open the module for cyclic voltammetry.

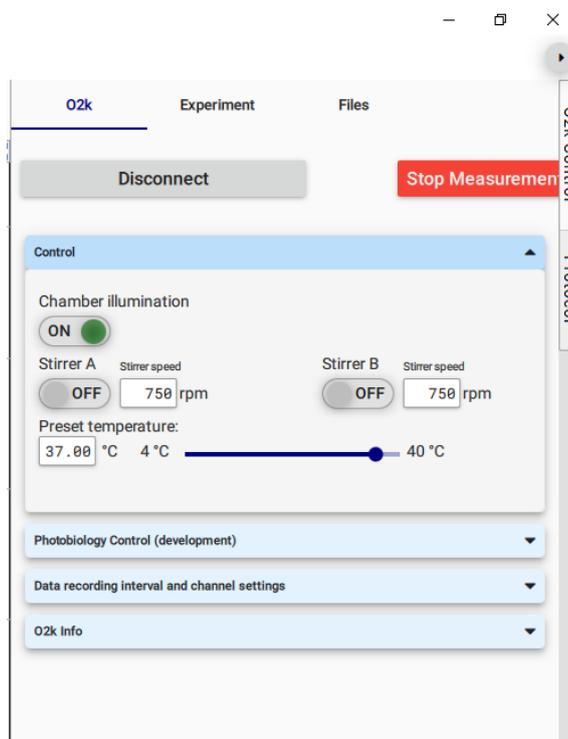


- f) Click on **Start Cyclic Voltammetry** to start the measurement.



The cyclic voltammetry will automatically stop after finishing five cycles.

- g) The CV can be stopped anytime by clicking on **Stop measurement** in the side menu.



- h) After finishing the measurement, click on **Disconnect** in the side menu to disconnect the software from the O2k.

1.2. Automatic and manual peak detection

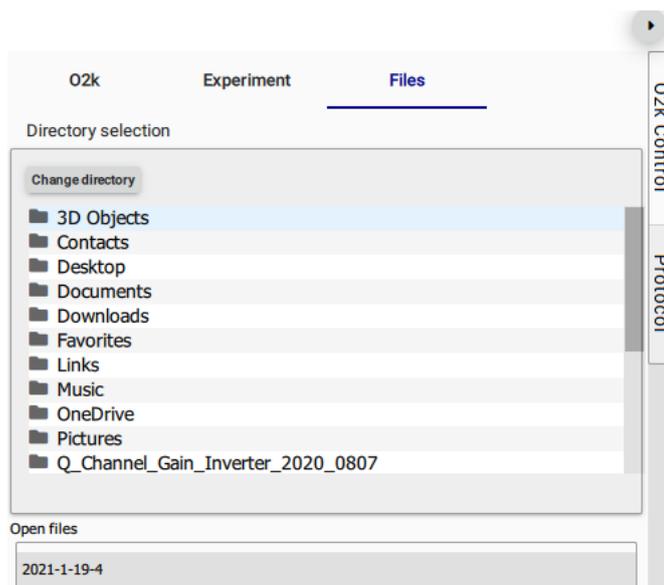
The software is able to automatically detect the oxidation and reduction peak potentials for both chambers, if the **automatic peak detection** is selected. By unclicking on the **Use automatic peak detection**, it is possible to select the peak by dragging the blue line

to set the reduction peak potential in the lower part of the traces and the green line to set the oxidation peak potential in the upper part of the traces.

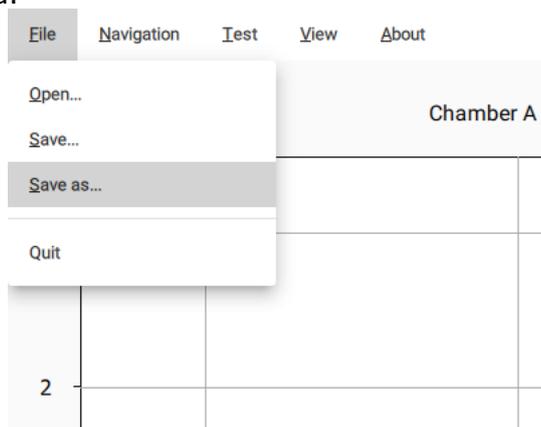
The value obtained for the oxidation peak potential value (mV) will be used to measure the Q redox ratio with DatLab 7.4 (type it in 'O2k control/Potentiometric/Offset voltage [mV]'). In DatLab 7.4, select 100 as **Gain for Q sensor** and select **Q_ena**. Click on **Send to O2k** to start the measurement.

1.3. Saving and exporting data

Files are automatically saved in a .dld8 file format. The directory can be selected in the side menu by clicking on 'Files':



When the measurement is finished, the file can be saved under a different file name, optionally in a different directory, under the 'Save as' function by clicking on 'File/Save as...' in the upper menu.

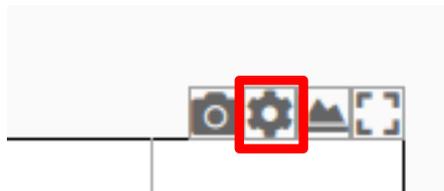


After the experiment, there is the option to **Export to CSV** (.csv file format). To copy the oxidation and reduction peak potential values into a Spreadsheet program, click on **Copy to clipboard**.

The figures can be saved separately as .png files by clicking on the  camera icon in the upper right corner of each chamber plot.

1.4. Scaling

The scaling of the axis can be changed by clicking on the icon next to the camera in the upper right corner of each chamber plot. Afterwards, in the right side of the menu, it is possible to change the scaling. Of note, it is necessary to click on the respective icon of the specific chamber before re-scaling the axis.



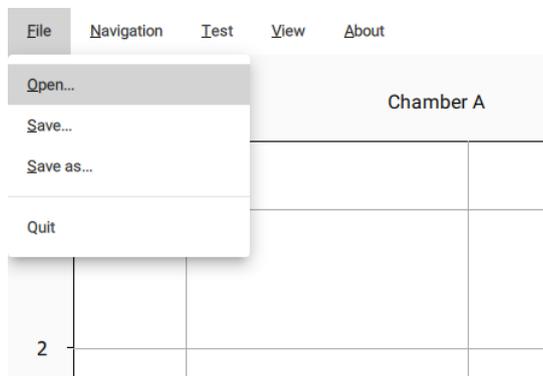
1.5. View

To zoom in on the data range in the figures, click on the icon next to the scaling icon in the upper right corner (3rd icon from left). The original view can be reset by clicking on the icon next to the "zoom" icon (4th icon from left).



1.6. Opening a file

The previously recorded .dld8 files can be opened by clicking in the upper menu on 'File/Open'. It is possible to open more than one file at the same time.



- ▲ **Important** Before closing DatLab 8.0, make sure that the stirrers are switched on in both chambers in the side menu.
- ▲ **Important** If a measurement in DatLab 7.4 is started afterwards, do not forget to change the Data recording interval in the **O2k control** window in the System tab back to 2.0 sec.

Acknowledgements



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Author contributions

Komlodi T, Iglesias-Gonzalez J and Gnaiger E were responsible for the project and instrumental development. Haider M developed the software. Komlodi T and Cardoso LHD performed experiments and tested the software. Komlodi T, Cardoso LHD, Iglesias-Gonzalez J and Tindle-Solomon L prepared the MiPNet.