

ChemWiz ADK User Guide

The ChemWiz-ADK Series 3 Handheld NIR Spectrometer is a rugged and easy-to-use, research grade near-infrared spectrometer for lab and field testing of sample composition with no additional setup required.

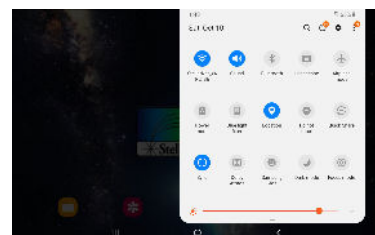


System Power & Spectrometer Engine Connection

The ChemWiz-ADK Handheld NIR spectrophotometer is delivered pre-installed. All a user must do is press the main system power button on the right side of the handheld case and the power button will illuminate. This turns on the main spectrometer engine and usually takes about 1 minute to initialize.



Next, the user must turn on the the system's Android tablet interface located on the top side of the touchscreen display. The tablet will turn on and allow normal operation of the Android system.



As soon as the spectrometer engine initializes, the Android tablet will automatically connect to its WiFi signal. You can verify or reconnect to your spectrometer engine at anytime by reviewing your WiFi settings.

WiFi network is StellarNet_zAP2_deviceID and password is always *stellarnet*. If connection is lost it could be because you (1) have added a stronger wireless network to your device and your system connects to it automatically or (2) your spectrometer engine's main battery supply is depleted and a re-charge or plug-in is required to reconnect. Forgetting other wireless networks allows your device to automatically connect.

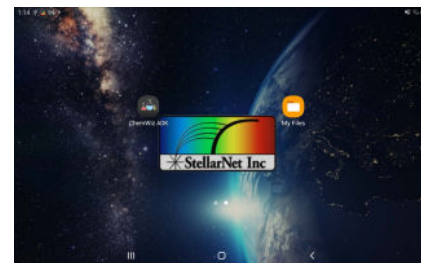


Launching the ChemWiz-ADK Software

The handheld system's software, named ChemWiz ADK, will be located on your system's home screen and can be launched by pressing the icon.

This is the same App found on Google Play and Apple Store for our WiFi enabled spectrometers; however, we have tailored the graphics for an 8" touchscreen and upgraded and added many new features, such as continuous mode, snapshot, & file review.

Acquire full spectrum NIR analysis of solids, liquids, and powders. Measure real-time composition analysis such as moisture, protein, fat, and much more! Analyze unknown samples using spectral matching algorithms.

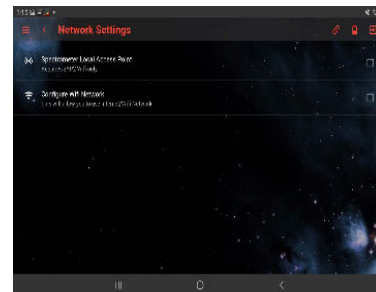


Easily create your own libraries. Built in PLS model builder with statistics and loadable real-time prediction. Save scope spectra, absorbance, and concentration data. Save spectra, data/prediction result, and export as .SSM, or .PRED or .ABS text data files, screenshots, and/or PDF reports with all parameters listed. Integrated halogen light and RF-HH snap on reflectance fixture



Software and Spectrometer Engine Connection

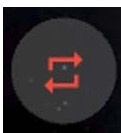
Once the ChemWiz ADK software has been successfully launched the first step is to verify connection. Click the connection icon to visit the Network Settings menu option. There you can see your connection. For this device the ***Spectrometer Local Access Point*** should be automatically checked. If there is a problem with connection, you can uncheck and recheck this option to re-establish connection. Once connected, it will say "zAP2-Connected". If you can not connect either (1) you are connected to a different wireless network or (2) your spectrometer engine's main battery supply is depleted.



Main System Button Overview



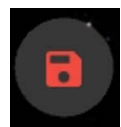
Capture - captures single spectrum



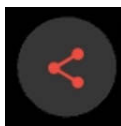
Continuous Mode Start/Stop - starts or stops captures spectra continuously



Expand Screen - expands screen to increase size of the spectral plot



Save Data - saves spectral data as .SSM, IRR, screenshot, and PDF report with all parameters listed to ChemWiz ADK folder



Share Data - SSM/ABS are .txt files that can be reviewed in SpectraWiz or Excel. If you share via email and change the WiFi network you will have to re-connect to the device in order to begin collecting spectral data.



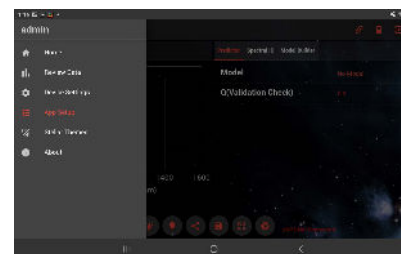
Take Dark Spectrum - a dark spectrum should be taken after your Device Settings are changed and your system is optimized using the RS50 white reference spectrum. Turn off lamp and click to capture.



Take Light Spectrum - after a dark spectrum is taken the lamp should be turned on and the RS50 measured as your light spectrum

Main Menu

The left side menu is the ChemWiz ADK's main menu containing Review Data, Device Settings, App Setup, Stellar Themes, About and Help Section.



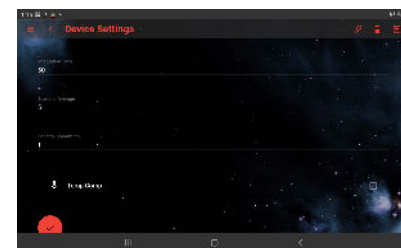
Review Data

Saved Data can be loaded for review in the App Setup menu. Selecting the Review Data menu item allows you to browse all of the existing saved spectra you have taken. All systems will also be delivered with DEMO spectral data. This option lists all .ABS files located in the ChemWiz ADK folder.



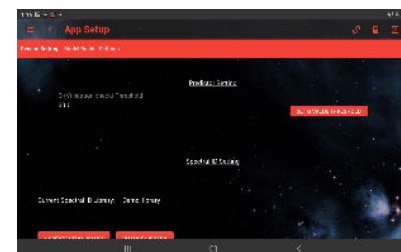
Device Settings

The Device Settings menu option allows you complete control of the NIR spectrometer parameters. These are integration or exposure time, scans to average, and pixel smoothing. Device setting parameters are saved to a system configuration file and are remembered when the software is re-opened. When using the system as a reflectance spectrophotometer once your settings are optimized you rarely have to change them.



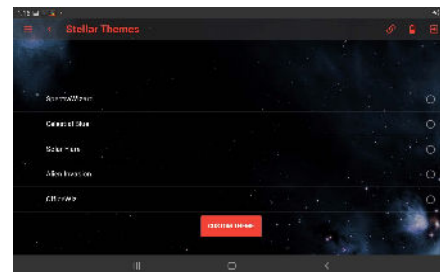
App Setup

The App Setup menu option allows you to create and change the spectral ID Library. Additionally, you can select and de-select the files that you would like to save. All methods and saved files will be found in your ChemWiz directory. In this menu, you can also turn on or off the beginners mode and chart cursor. In the Model Builder Settings tab, the model for the predictor can be created by enter the model name and component names.



Stellar Themes

This menu option allows you to choose the color theme of the app! Choose from SpectraWizard purple, Celestial blue, Solar Flare red, Alien Invasion green, and Office Wiz white. Or design your own color to go along with your company or university.



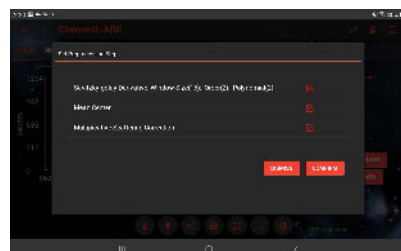
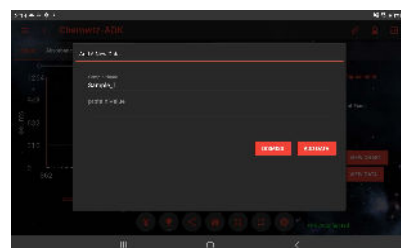
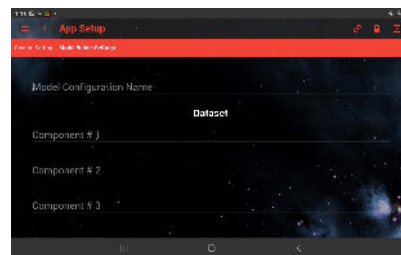
Measurement Procedure

1. Turn on the ChemWiz ADK's main spectrometer engine (right side power button) and tablet (top)
2. Launch the ChemWiz ADK App
3. Verify software and spectrometer engine connection
4. Snap on reflectance fixture (RF-HH) for sample holder, place the white RS50 white reflectance standard on the fixture and collect a spectrum by click on the **Capture** button
5. Verify your Device Settings are properly set. Turn on the light source and push the **Take Light Spectrum** button to optimize the white light reflectance spectrum. Typically, 5-6ms integration time, 300 sample averages, and 2 smoothing are best. The maximum count for the scope graph needs to be as close to 40,000 as possible. However, the setting can adjusted for different sample types. These settings should be saved to your systems configuration file and automatically be set upon system initialization. If they are not, you can easily re-set the parameters and exit the software and they will automatically be updated.
6. With the RS50 on top of the reflectance fixture, turn off the lamp source and press the **Take Dark Spectrum** button. The ChemWiz ADK App update the Scope and Absorbance graph.
7. Now ready to capture spectrum. Place the sample and push the **Capture** button.



Create Model Builder Procedure

1. Go to "App Setup", and select "Model Builder Settings" tab
2. Enter the model configuration name and the components name. Note, if the model only has one component, you can leave the other component blank.
3. Click the "Configure Model" button, the model configuration will automatically be loaded into the model builder
4. Navigate back to the home screen and click "Model Builder" tab on the right pannel. You should see the recently created model configuration is loaded. If not, click on the "Edit Model" button and then select the model folder and click .ini file to load the configuration
5. Follow the measurement procedure above to capture the reference and the dark data
6. Place the sample on top of the fixture and click the **Capture** button to collect the spectrum
7. Click the "Add Data" button to add the sample
8. A popup window ask you to enter the sample name and the component values, click "Add Data" button to save the data
9. Repeat Step 6 to Step 9 until all desired samples are added for the model building. Note, at least 3 data values are needed. However, more data is better!
10. Click "Compute Model" button to create a model using the added data
11. In the popup window, select the data preprocessing steps. Note, depends on the data, some preprocessing might have negative affect, thus several trials of computing the model might be needed to achieve the best model
12. Click "Comfirm" to compute the model.
13. In the "Model Builder" panel, computed model result will be displayed, this includes R square(close to 1 is better) and RMSE (close to 0 is better). This information is used to determine the goodness of the model. Recompute or add data to improve your model. Note: if R square is nan, then more data is needed
14. Multiple models can be saved after computation by click on the "Save Model" button. Added data can be reviewed/ removed in "View Data". "View Chart" will displayed the relationship between real data and predicted data.
15. Click **Save Data** button while in the "Compute Model" tab, will save the most recently captured data spectrum.



Quick Video Demo for
PLS Model Builder and Predictor

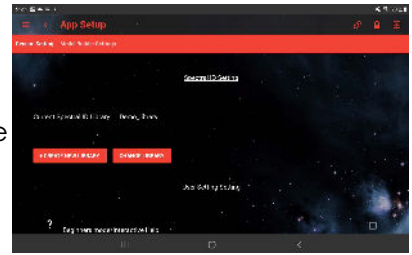
Load Computed Model for Prediction

1. Saved models can be loaded in the App in the "Predictor" tab by tapping on "Model". Then click on your model folder, and you will see all the computed models for that configuration. Select the model ADK file to load your model
2. Place the sample that you would like to measure on top of the fixture.
3. Click the capture button to capture the data, then the predicted component values will be displayed
4. Click the **Save Data** button while in the "Predictor" tab, this will save the prediction results (.PRED).



Build Spectral ID Proceduer

1. Go to "App Setup", in the "General Setting", and click "Create New Library"
2. Enter the name for the library folder and click save
3. Click "Change Library" and select the library that you would like to work with
4. Navigate back to the home page and tab on "Spectral ID" on the right panel. The current Library will display the name of the library that you are working on
5. Follow the same measurement procedure to capture the sample data
6. Click "Add to Current Library" to add the captured sample into the working library
7. In the popup window, enter the sample name and click save to save the sample
8. Repeat Step 5 to Step 7 to add samples and the sample in the working library can be viewed or removed by click on "View current library"
9. Spectral ID matching process will start when data size reaches 3. Thus, at least 3 samples are needed for spectral ID matching
10. Click **Save Data** button while in the "Spectral ID" tab to save the spectral ID matching results.



Quick Video Demo for Spectral ID

Android File Transfer

Due to the restrictions imposed by Android 11 and newer version. Apps are permitted to see only their own folders and not those of other apps. To resolve that problem, an external app called "[X-plore File Manager](#)" can be installed from the Play Store for file transfer. *You may be prompt to "Allow access to all files" on the first start of the app.

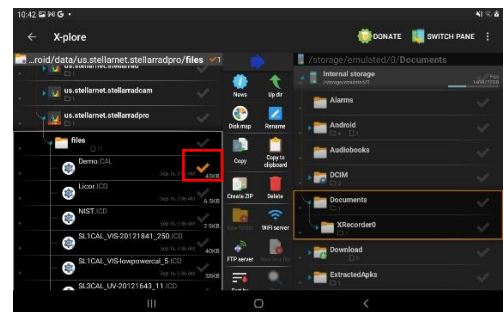


File Transfer Direction
From → To



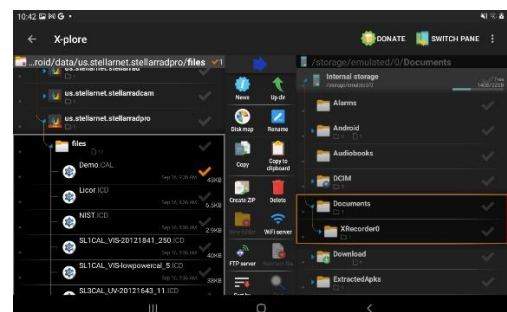
Follow the steps below to transfer files from one folder to another:

1. Make sure the File Transfer Direction is pointing to the folder that you want to move the file to. (To follow the steps below, make sure the File Transfer Direction is pointing to Pane B).
2. On Pane A (FROM), **locate** and **check** the file(s) that you want to make a transfer. Allow special access if prompted.

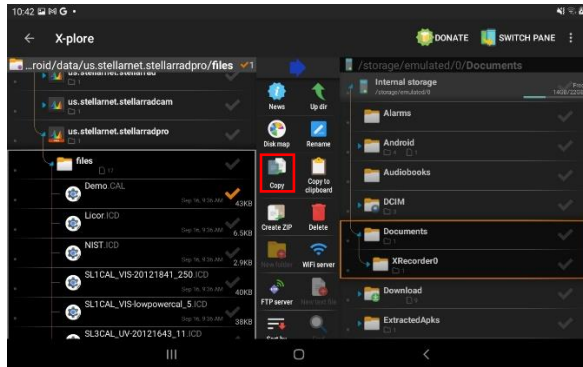


3. On Pane B (TO), **navigate** to the folder (or USB drive storage) that you want to transfer the file(s) to.

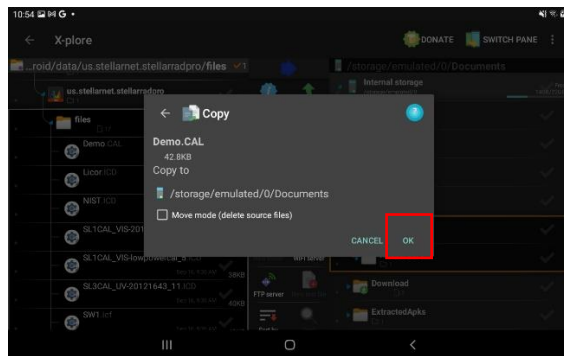
** For USB, make sure the switch is set to "Use USB" on the side of the system. Otherwise, the USB will not be recognized.



4. In Control Pane, **click** "Copy".

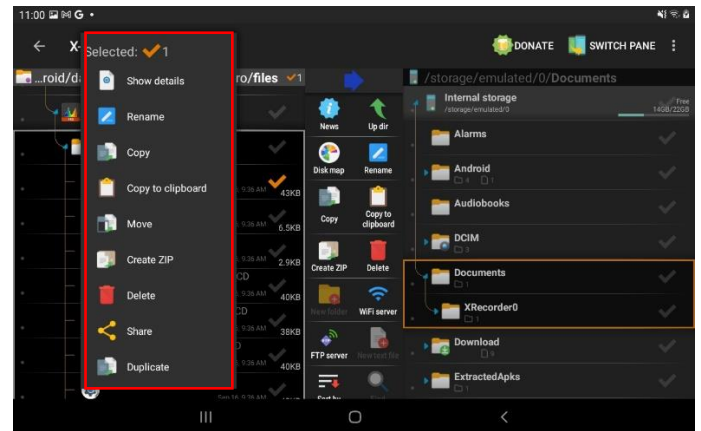


5. In the copy popup window, you will see the name for the selected file and the path location, selected at step 3, that you want to transfer the file to. **click** "OK" to complete the transfer.



Additional File(s)/Folder Handling

- Hold down the file/folder for additional operations, including file renaming, zip file, delete, share, and duplicate file, etc.



* Note: All data files for the StellarNet Apps are located in

Internal storage -> Android -> data

i.e.

Internal storage -> Android -> data ->

us.stellarnet.stellarradpro for StellarRad Pro