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Nicolet Series FT-IR Spectrometers

Nicolet iS20

Getting Started

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ThermoFisher SCIENTIFIC

For technical support, please contact: www.thermofisher.com

For Research Use Only. This instrument or accessory is not a medical device and is not intended to be used for the prevention, diagnosis, treatment or cure of disease.

WARNING Avoid an explosion or fire hazard. This instrument or accessory is not designed for use in an explosive atmosphere.

Getting Started

Congratulations on your purchase! The Thermo Scientific™ Nicolet™ iS™20 spectrometer is designed with integrated validation features, a powerful software suite, and many other features that make it easy for you to collect data and get the answers you need.

Nicolet iS20
FT-IR spectrometer

This manual explains the features of your spectrometer and takes you through a basic sample collection.

NOTICE Read the Site and Safety guide that came with your spectrometer before using the instrument! The guide contains important information to help you avoid personal safety risks and equipment damage. A copy of the Site and Safety guide is available in PDF format in your electronic documentation set.

Contents

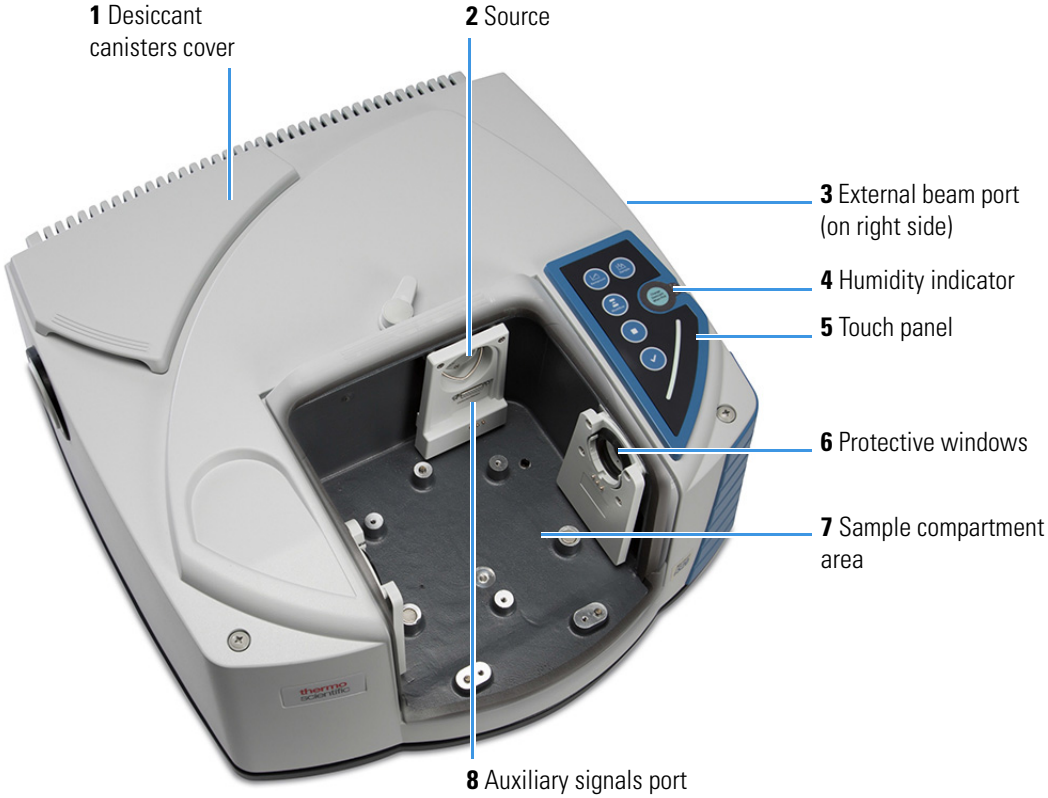
What's in the box?

Your spectrometer will be unpacked and installed by one of our service representatives, but if necessary, you can unpack the shipping box before the installation.

NOTICE To avoid permanent damage to the optical components in your spectrometer, do not open anything, especially the plastic bag that protects the spectrometer, until the entire shipping box has come to room temperature. See "What about the warranty?' in the "Taking the Next Steps" chapter for more information.

What are the features?

The following drawing shows the main features of your spectrometer. After the drawing, you will find descriptions of these features. For additional information, see Spectrometer Help Topics available through the Help menu in the OMNIC™ software.



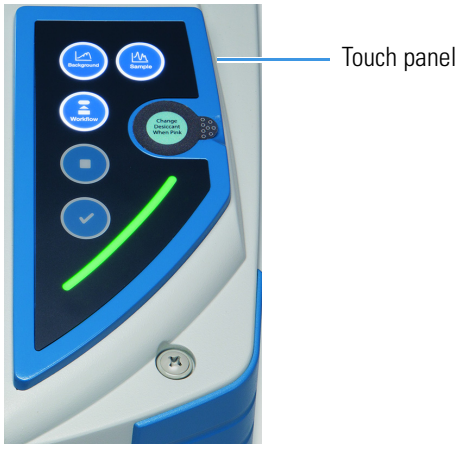
1. Your spectrometer is protected from excessive humidity by two desiccant canisters located in a compartment below the desiccant canisters cover. For information about regenerating and replacing these canisters, choose Spectrometer Help Topics from the OMNIC Help menu, and then refer to the "Replacing the desiccant" and "Regenerating the desiccant" topics.

2. You can change the source in your instrument without removing the cover. Two sources are available: one for the mid-IR range and another for the near-IR range (tungsten-halogen). (For information about changing the source, open Spectrometer Help Topics from the OMNIC Help menu and choose > Installing or Replacing Hardware > Changing the Source.)

3. The external beam port on the right side of the spectrometer allows the spectrometer to be connected to an FT-IR microscope or a Nicolet iZ10 module.

4. The humidity indicator monitors the level of humidity inside the spectrometer. The status is indicated by the color of the indicator:

5. The integrated touch panel has buttons and indicators that allow you to perform many operations without needing to use the computer. The instrument scan bar provides visual feedback on run, idle, and alert modes, so you know what your next action should be. You can use the Workflow button to easily create and run workflows to streamline your data analysis and get answers fast. For more information about advanced operations with the touch panel, see Spectrometer Help Topics (available through the Help menu in OMNIC software). The other buttons are explained in the "How Do I Collect a Spectrum" chapter in this document.



6. Your spectrometer is protected from environmental humidity and other chemical vapors by two windows. These windows isolate the optics in the spectrometer and are coated to improve their resistance to water vapor. You still, however, need to be careful when cleaning your spectrometer to avoid damaging the optics or the windows. For more information, see "Cleaning your spectrometer" in Spectrometer Help Topics (available through the OMNIC Help menu).

7. You can use the sample compartment with many different accessories, such as a:

   - **The Smart OMNI-Transmission Accessory:**

     Use the transmission accessory to collect data from samples held in any of the typical transmission cells or holders, including:

     – Standard liquid cells
     – Film holders
     – KBr pellet holders
     – ST-IR cards
     – Gas cells

   - **Other Smart Accessories™:**

     A wide range of Smart Accessories can be used, including:

     – Attenuated total reflectance (ATR)
     – Diffuse reflectance (DRIFTS)
     – Specular reflectance
     – Temperature controlled accessories
     – Near-infrared integrating sphere

     Note The included tray provides storage below the accessory and protects the cover of the instrument.

- **Large baseplate-mounted accessories:**

  An optional sample compartment extension allows you to install specialized accessories, including:

  – Thermal Gravimetric Analysis (TGA) interface

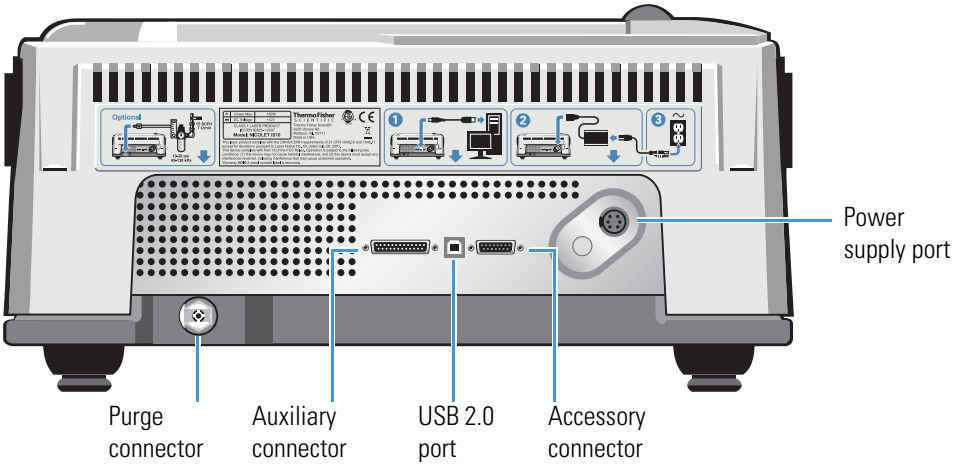
  – Multi-pass (long pathlength) gas cells

  – Other accessories

8. The auxiliary signals port is used for accessories with detectors or power needs, such as the near-IR integrating sphere.

What's on the rear panel?

The following drawing shows the connectors that are on the rear panel of your spectrometer:



- The USB 2.0 port is where you connect the system computer. The instrument can interface with USB 2.0 and USB 3.0 devices.
- The power supply port is where you connect the power supply for the instrument.
- The Accessory connector is used to connect the instrument to a Nicolet iZ10 module or other accessories.
- The Auxiliary connector allows you to start a data collection remotely and also allows service personnel to check the function of the spectrometer.
- The Purge connector is where you connect a purge gas supply if you purchased the optional purge package.

Collecting a Spectrum

To collect a sample spectrum, you must first collect a reference (or background) spectrum that shows the response of the system when no sample is present. Once you have the background spectrum, you can collect data with a sample in place. The sample data is then ratioed with the background data, which leaves only the signals from the sample.

How do I collect a spectrum?

The following procedure takes you through the data collection process for the most commonly used techniques: attenuated total reflection (ATR), transmission, DRIFTS, and specular reflection. (For more information, see the electronic documentation that came with your spectrometer.)

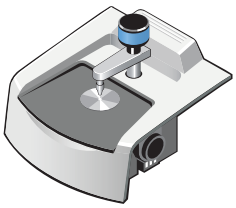
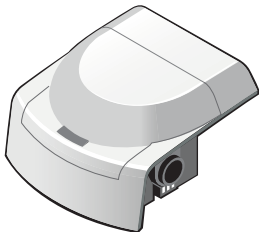
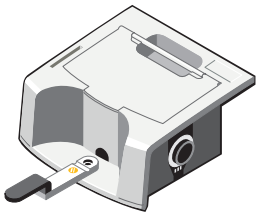
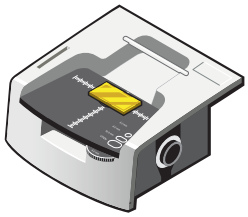
Note

- For additional information about preparing the system and starting OMNIC software, see Spectrometer Help Topics and OMNIC Help Topics in the OMNIC Help menu) and the documentation package that came with your system.
- The software may display various prompts during collection. If any prompts appear, follow the instructions shown on the screen.

Begin by starting OMNIC software:

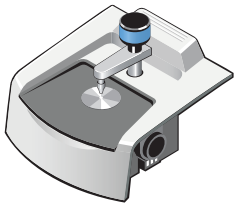
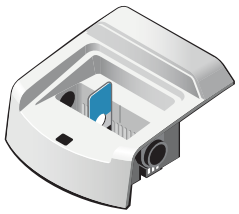
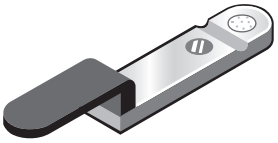
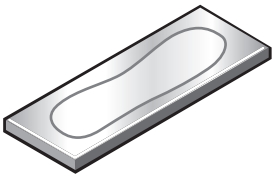
You can double-click the OMNIC shortcut on the Windows® desktop or you can use the Start button on the Windows taskbar.

Next, make sure the sampling accessory is properly installed in the sample compartment:

If you have...	You should...
An ATR accessory 	Make sure the pressure device, if included, is not in contact with the crystal. Clean the crystal with a soft cloth and, if needed, an appropriate solvent. See the documentation for your ATR accessory and crystal type for details.
The Smart OMNI-Transmission accessory 	Make sure no samples that would block the infrared beam are installed in the accessory.
A DRIFTS accessory 	Make sure the slider is pushed in to the second cup (the one closer to the handle). This positions the gold disk in the beam.
A specular reflection accessory 	Place the gold mirror (provided with the accessory) face down on the accessory.

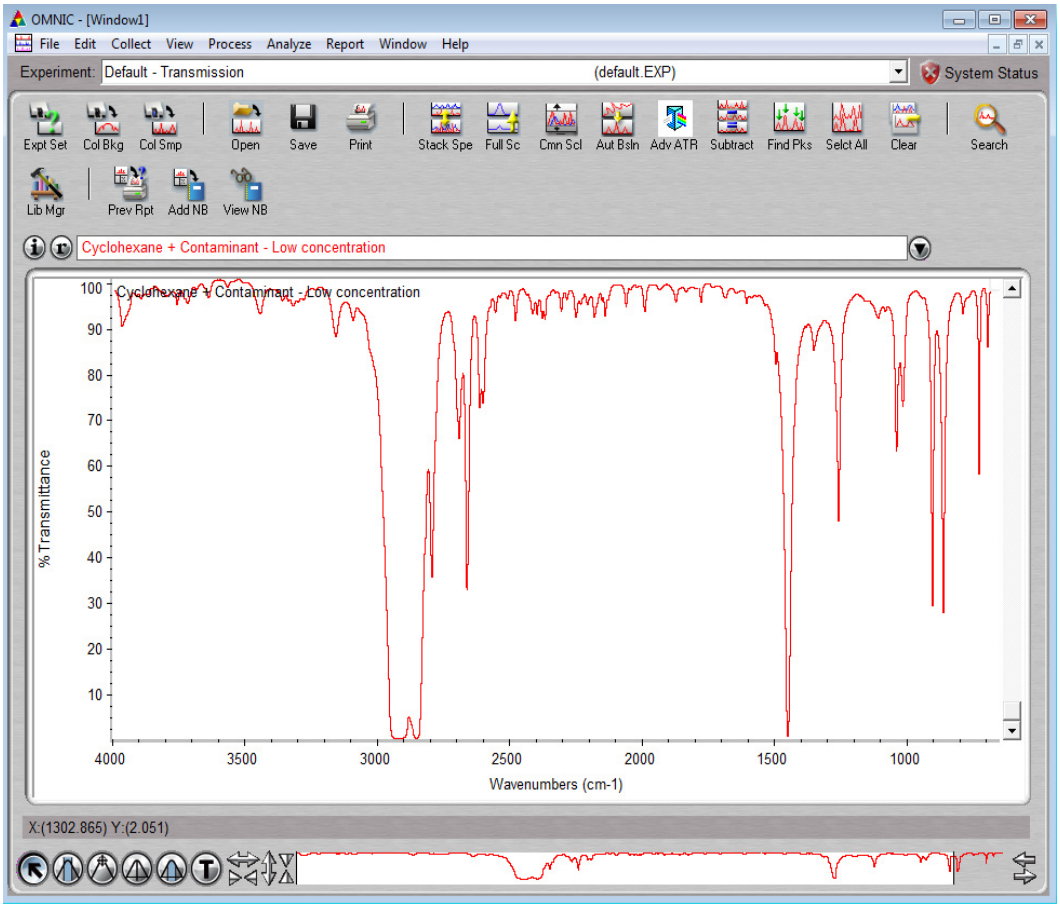
Now, press the Background button on the touch panel to collect a background spectrum:

Next, install a sample:

If you have...	You should...
An ATR accessory 	Place the sample on the crystal and apply pressure. A good first sample might be a credit card or a piece of plastic. For liquids, no pressure is needed.
The Smart OMNI-Transmission accessory 	Slide a sample into place. A good first sample is a plastic bag or any polymer film.
A DRIFTS accessory 	Fill the cup with a sample. A good first sample is a ground aspirin tablet diluted to 3-5% in KBr powder. You do not need to overfill the cup.
A specular reflection accessory 	Place the sample upside down on the accessory. A good first sample is a piece of shiny metal, like aluminum, with a thin coating of vegetable oil. Add a drop of oil, and then wipe the metal with a cloth so that a thin layer of oil remains.

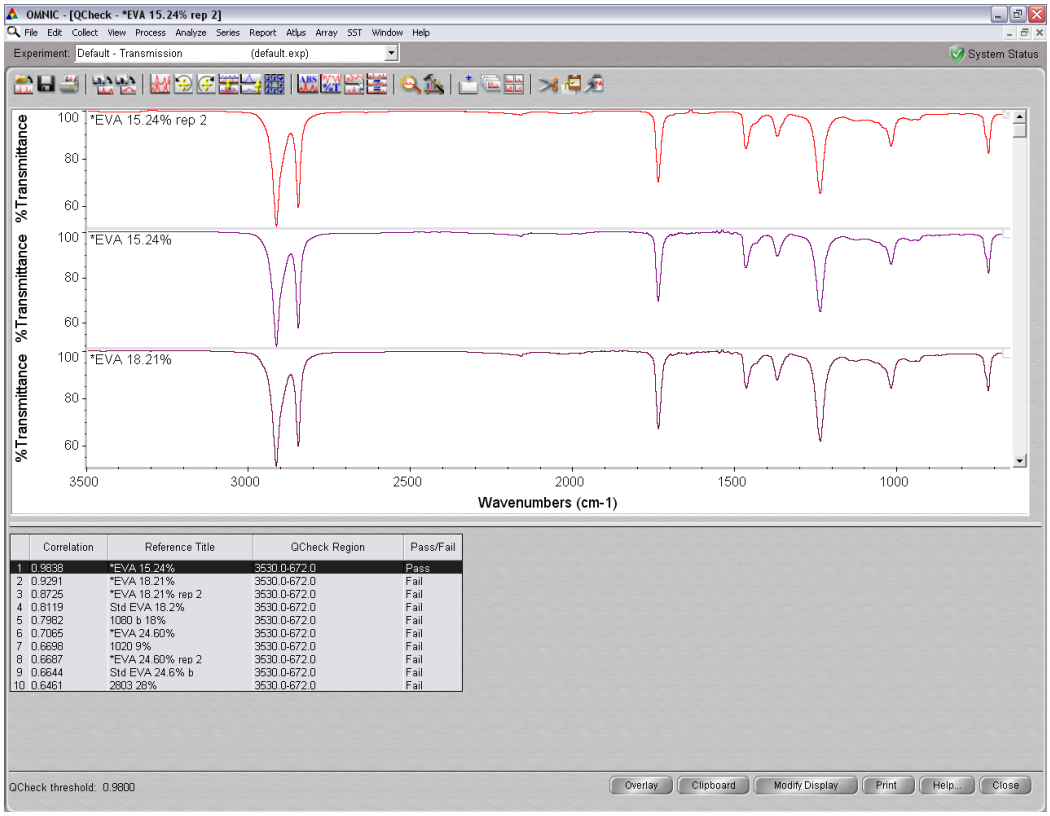
Now, press the Sample button on the touch panel to collect a sample spectrum:

When the data collection is complete, the sample spectrum will be displayed. The following is an example of a typical sample spectrum displayed in %transmittance.

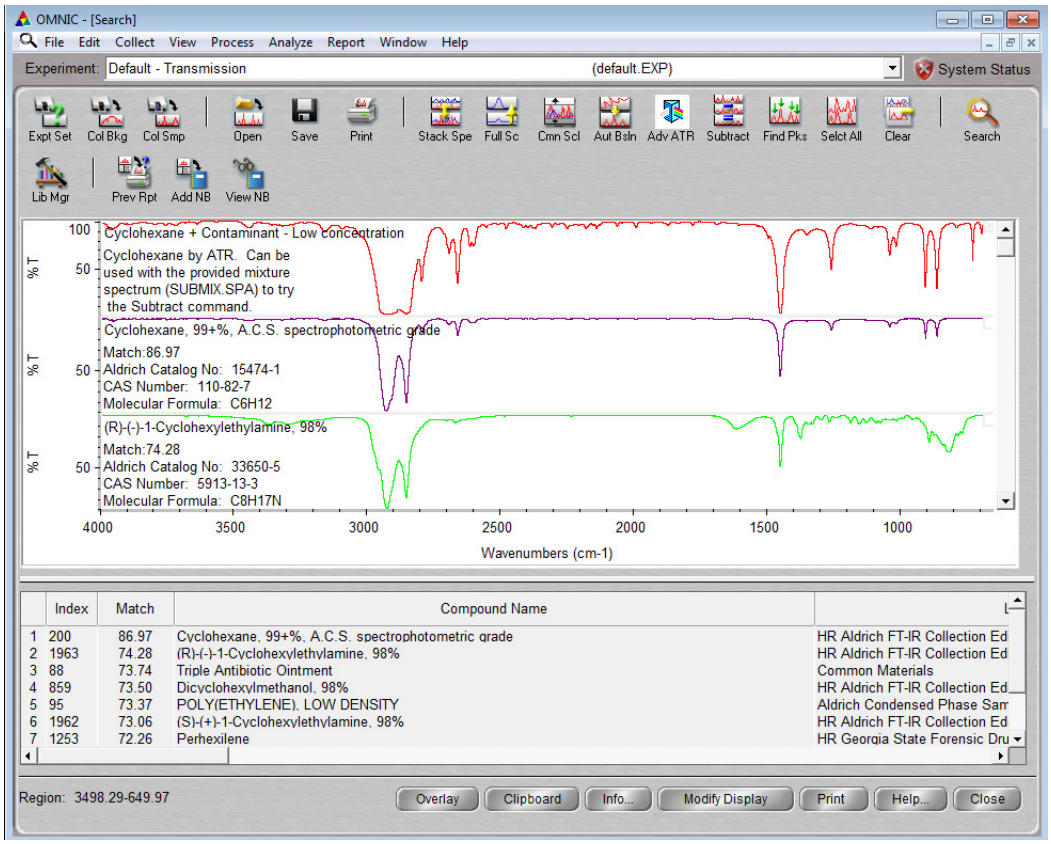


Finally, you can verify, identify, and quantify your data:

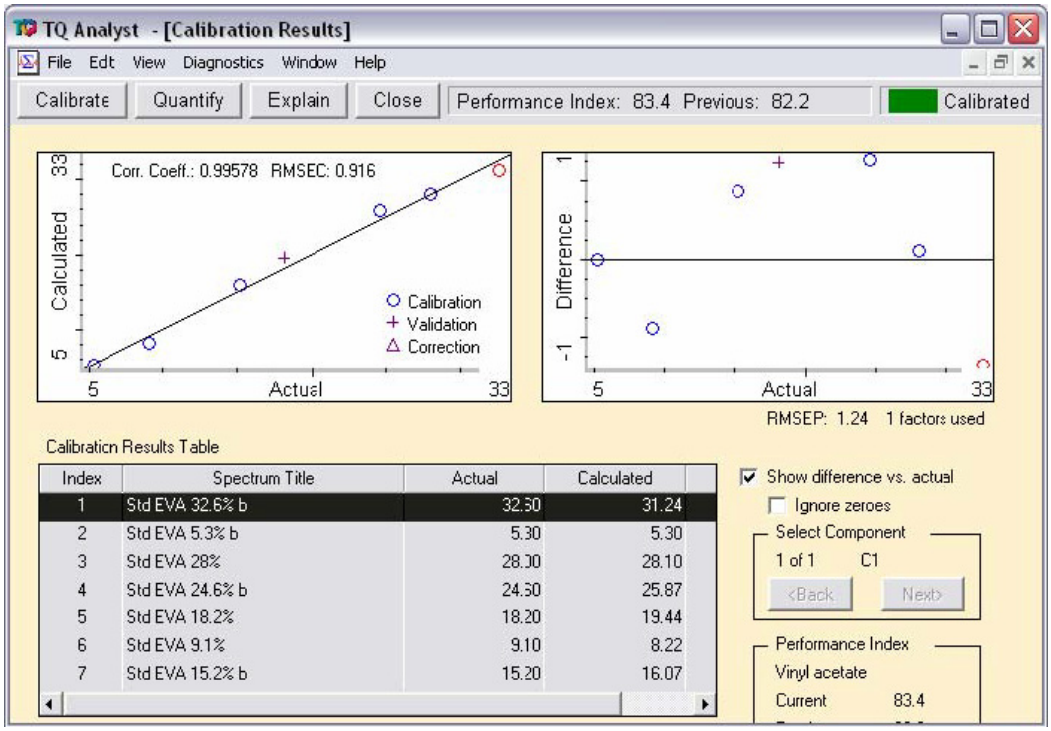
If you want to...	You can...
Verify the purity or quality of your sample	Use the OMNIC QCheck tool.



If you want to...	You can...
Identify an unknown material	Use the OMNIC Search feature or the Specta software features.



If you want to...	You can...
Quantify the amount of a component in your sample	Use the features in the TQ Analyst™ software.



Taking the Next Steps

Now that you are familiar with your spectrometer and have collected a sample spectrum, you're ready to explore other options and learn where you can find additional information.

What options are available?

Several accessories, or instruments, that expand what you can do with your spectrometer are available. The following is a list of some of these accessories. (For information about additional accessories, contact our sales representative in your area.)

This accessory or instrument...	Does this...
A Nicolet iZ10 	Provides a second sampling area for routine analysis or for installing and using large, dedicated accessories like the TGA interface.
An infrared microscope 	Allows you to identify particles as small as 10 micrometers and perform many operations such as surface analyses and chemical mapping.
A near-IR integrating sphere 	Uses a built-in detector to quickly identify materials contained in vials or blister packs.

The following software is also available for your spectrometer:

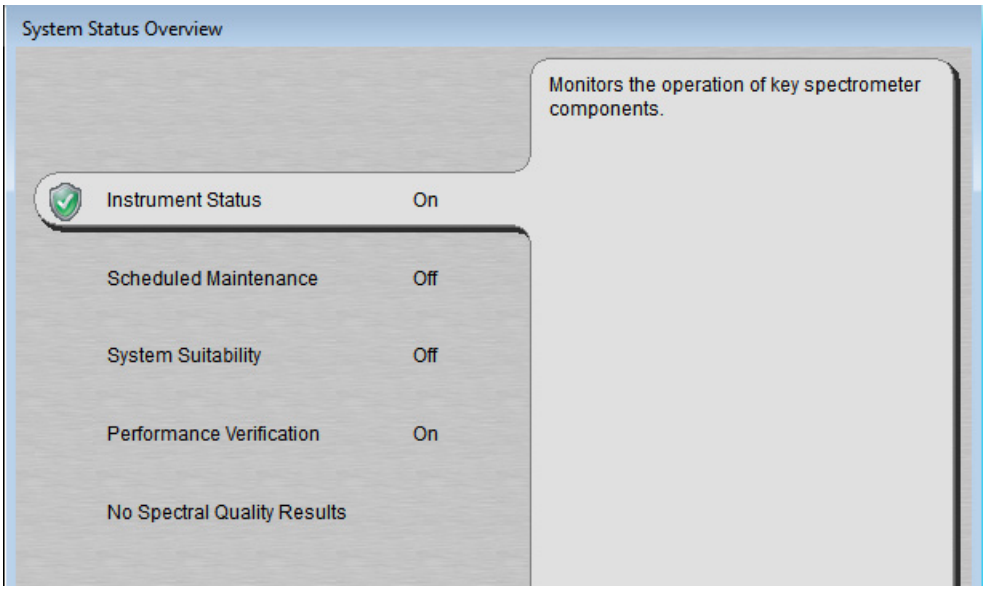
- *OMNIC Anywhere* cloud-based FT-IR software allows you to analyze data away from the instrument, on any device, or share results with colleagues across the globe in a secure environment.
- *OMNIC Specta*™ software enhances the features and procedures you can use to analyze unknowns. This software includes a 9,000 compound spectral database and features for using your computer's hard drive as a library. OMNIC Specta also offers a unique multi-component search feature that makes it easy to identify the spectra of mixtures and TGA/IR vapor phase samples.
- *TQ Analyst* software provides an extensive suite of chemometrics features you can use to create methods to identify raw materials, perform quantitative analysis, and take spectral measurements. (The basic tools for using methods created in TQ Analyst to analyze spectra are included with your OMNIC software.)

How do I check performance?

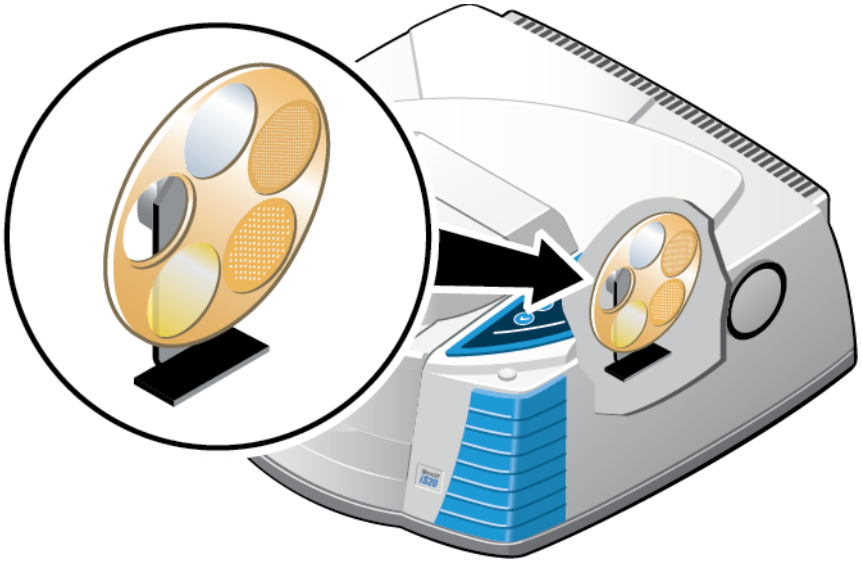
The performance of your spectrometer is continuously monitored by the System Performance Verification (SPV) features in OMNIC software. For detailed information about using SPV, open OMNIC Help Topics from the OMNIC Help menu and find "System Performance Verification." To summarize, SPV allows you to:

- Perform ASTM tests to verify your spectrometer's performance.
- Define system suitability tests that are specific to your application.
- Monitor data collection.
- Notify users when a test is out of date.
- Implement complete, automated validation with the optional ValPro™ Qualification software.

The following is an example of the System Status Overview message box, which gives you access to SPV features.



Note The standard wheel that SPV uses is shown below. This wheel contains NIST traceable and NG-11 standards.



How do I maintain my spectrometer?

The spectrometer's multi-color scan bar provides instrument status information at a glance. Whether the instrument is ready for analysis, collecting data, or needing attention, you are notified with a splash of color on the scan bar.

Scan bar states:

- Solid-pulsing green light. Instrument is ready for use.
- Moving green light. Data collection is in progress.
- Solid-pulsing yellow light. User-selected spectral quality, ValPro qualification, or performance verification check has failed or a scheduled maintenance procedure is required.
- Quick-pulsing red light. Instrument requires attention (check System Status and Advanced Diagnostics in OMNIC software for more information).

To keep your spectrometer in good working order, check the desiccant indicator frequently and replace the desiccant canisters as soon as they become saturated. (For more information, see item 1 in "What are the features?" in the "Getting Started" chapter.)

If you want to clean your spectrometer, you can wipe off the exterior of the main cover, but do not allow any moisture to come into contact with the windows. For more information, see "Cleaning your spectrometer" in Spectrometer Help Topics (available through the OMNIC Help menu.)

Where is the documentation?

Audit requirements and good practices often make it necessary for you to keep track of important documentation for your instruments. The following documents are available in PDF format in your system documentation set. The documentation set is installed on the instrument computer along with the software.

- Nicolet iS20 Getting Started
- Nicolet iS20 Site and Safety guide
- Nicolet iS20 User Guide
- Statement of traceability for the 1.5 mil polystyrene transmission standard
- Statement of traceability for the NG-11 glass transmission standard
- Declaration of system qualification
- NIST traceability certificate (if you have the optional ValPro Qualification software)

Note For more information about validation products that are available, contact our sales or service representative in your area or contact us.

Other resources for learning more about your spectrometer, the software, and accessories include:

- The OMNIC help system, which is available through the Help menu in OMNIC software.
- The SPV help topics in the OMNIC help system. (Choose OMNIC Help Topics from the OMNIC Help menu and find "System Performance Verification.")
- Other documentation or tutorials that came with your system.

What about the warranty?

Your spectrometer is designed to work reliably for many years, and our software features allow you to keep careful track of its performance. We stand behind our instruments by providing a warranty for the entire system for 12 months (14 months from shipment date).

Note The warranty does not cover damage to the hygroscopic parts (the purge windows and the beamsplitter) if the spectrometer is exposed to excessive moisture or if the cover is removed for an extended time by someone other than one of our representatives. To see the complete warranty or warranties for your spectrometer, see the documentation set for the system.

NOTICE Your spectrometer is intended to be unpacked and installed by one of our service representatives, but if necessary, you can unpack the shipping box before the installation. To avoid permanent damage to the optical components in your spectrometer, do not open anything, especially the plastic bag that protects the spectrometer, until the entire shipping box has come to room temperature. Damage due to unpacking the spectrometer before it has come to room temperature is not covered by the warranty.