Smart OMNI-Sampler

This tutorial introduces the Smart OMNI-Sampler accessory for Thermo Scientific's Nicolet Series Fourier transform infrared (FT-IR) spectrometers. The Smart OMNI-Sampler allows fast, easy horizontal attenuated total reflectance (HATR) analysis of all kinds of samples using a single-reflection crystal with a small sampling area.

Follow this tutorial to learn about HATR sampling with your Thermo Scientific spectrometer. It explains step by step how to install the OMNI-Sampler in the spectrometer sample compartment and use the accessory to analyze samples. You will also learn how to properly maintain and store the accessory when it is not being used.

Product features

The Smart OMNI-Sampler is designed for HATR sampling of hard and brittle solids and solids that have a rough or uneven surface. The product's curved crystal and unique tower design accommodate a wide range of sample types, from films and plaques to single fibers and polymer beads. You can also use the OMNI-Sampler to analyze liquids, pastes and gels.

269-359800 Revision A
December 2022 Thermo Fisher Scientific

The OMNI-Sampler provides reproducible pressure without user adjustment or alignment. A unique "auto-stop" safety feature prevents further compression when maximum pressure is applied, eliminating any concerns about damaging the sample or crystal.

Standard pressure tower

The standard pressure tower is a mechanical press used to achieve uniform contact between the sample and the ATR crystal.

The tower is mounted on a hinged arm that attaches to the OMNI-Sampler housing. The hinge allows you to raise the tower completely free of the sampling area, allowing ample room for installing and removing samples and for cleaning the sampling area and crystal.

Exchangeable tips

The standard pressure tower includes two tip styles that can be used to maximize contact between the sample and crystal.

Use the pointed tip to sample solids that have a flat surface.

The concave tip provides better contact with curved solids, such as a tablet or polymer bead.

We provide convenient storage for unused tips in the pressure tower base. To remove or replace a tip, simply screw the tip into or out of the base.

Optional lightning viewer

The Lightning Viewer is an optional pressure device that allows you to see the compressed sample during data collection. The sampling area can be magnified up to 8.5X to help you manipulate and accurately position small samples.

The Lightning Viewer's hinged mounting arm allows access to the crystal for sample installation and maintenance. Its pressure control provides the same reproducible, fail-safe compression as the standard pressure tower.

Smart OMNI-Sampler crystal

The Smart OMNI-Sampler's curved crystal provides a focused, 5 mm beam at the crystal surface. This is a 2x reduction in beam size over conventional single-reflection ATR accessories.

When measuring solid samples, the effective sampling area is defined by the diameter of the pressure point. The standard pressure tower provides an effective sampling area of 2 mm when the pointed tip is installed and 3 mm when using the concave tip. When the Lightning Viewer is used, the effective sampling area is slightly narrower than the 5 mm beam. It is ideal for analyzing discreet areas of a sample by placing the spot in the center of the crystal.

The crystal's small size and point-to-point contact with the pressure tower or Lightning Viewer make the accessory extremely rugged. This means you can analyze very hard solid materials with minimal risk of crystal damage.

Linear absorbance range

The short pathlength provided by a single-reflection ATR accessory produces absorbance values that are within the linear range of the technique and therefore permits more complete and accurate spectral subtractions.

This feature also makes the Smart OMNI-Sampler well suited for quantitative measurements of multi-component mixtures.

Smart Accessory features

The Smart OMNI-Sampler is part of Thermo Scientific's extensive family of Smart Accessories for Nicolet Series spectrometers. All Smart Accessories offer the following features:

- Pinned-in-place, permanently aligned optics.
- Fully integrated design.
- Snap-in installation.
- Automatic purging.
- Automatic recognition.
- Automatic experiment setup.

- Automatic performance checking.
- Multimedia IU!orials.

Product specifications

The Smart OMNI-Sampler features:

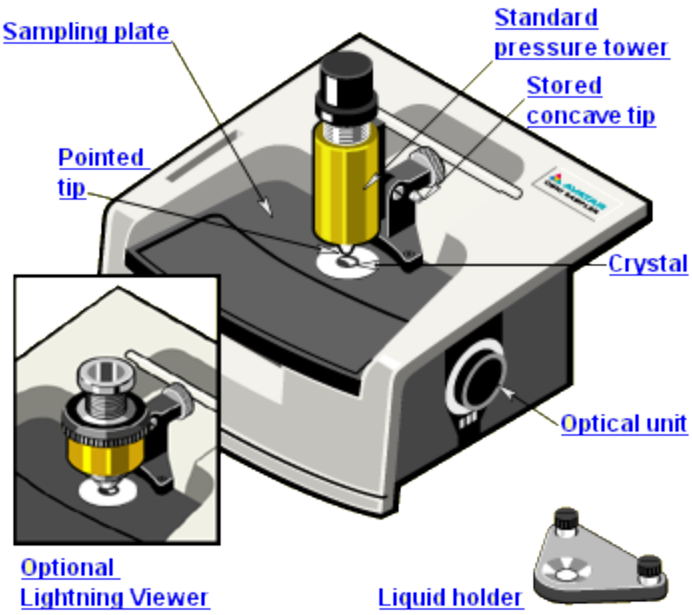
- Crystal material: Germanium (Ge)
- Refractive index: 4.0 @1000 cm
- Angle of incidence: 45" (1 reflection)
- Spectral range: 4000 - 675 cm·
- Beam diameter: 5 millimeters
- Depth of penetration: -0.67 micrometers at 2000 cm·
- Useful pH range: 1 lo14
- Liquid sample volume: 1.86 milliliters
- Pressure devices: Standard pressure tower with two exchangeable tips and an optional Lightning Viewer.
- Effective sampling area: 2 mm when using the pressure tower with the pointed lip, 3 mm with the concave tip, -5 mm when using the Lightning Viewer.

Product components

The Smart OMNI-Sampler's curved crystal and pressure device options make it ideally suited for analyzing a wide range of samples, including samples which are often difficult to analyze by ATR.

The accessory includes a pressure tower with two tip styles for analyzing flat and curved solids, and a liquid holder for analyzing liquids, pastes and gels.

The optional Lightning Viewer allows you to view or magnify the sampling area while you position a small sample under the pressure point.



Component	Description
Sampling plate	The sampling plate holds the crystal in the proper position for collecting the spectrum of a particular sample. The sampling plates are fully sealed and coated with Teflon® to protect them from sample materials that may be corrosive. A Teflon retaining ring protects the crystal from accidental knocks or bumps.
Standard pressure tower	The pressure lower is a mech-anical press used lo achieve uniform contact between the sample and the ATR crystal. The tower is mounted on a hinged arm that attaches to the OMNI-Sampler housing. The hinge allows you to raise the tower completely free of the sampling area, providing ample room for installing and removing samples and for cleaning the sampling area and crystal. The tower provides reproducible pressure without user adjustment or alignment. Our "auto-stop" safety feature prevents further compression when maximum pressure is applied, eliminating any concerns about damaging the crystal.

Tips	The standard pressure tower includes two tip styles that can be used to maximize contact between the sample and crystal. Use the pointed tip to sample solids that have a flat surface. The concave tip provides better contact with curved solids, such as a tablet or polymer bead. We provide convenient storage for unused tips in the pressure tower base. To remove or replace a tip, simply screw the tip into or out of the base.
Crystal	The single-reflection crystal causes the IR beam to bend and be reflected from its internal surfaces, producing an evanescent wave. When you place a sample in contact with the crystal, the energy from the evanescent wave can obtain absorbance information while penetrating only a short distance into the sample. ATR crystals are made from IR-transmitting materials that have a high index of refraction. The standard germanium (Ge) crystal has a refractive index of 4.0 and an angle of incidence of 45 degrees. The depth of penetration is approximately 0.67 micrometers at 2000 cm·. The crystal provides a focused, 5 mm beam at the crystal surface. For measurements in the mid-IR spectral range, the Ge crystal produces usable data between 4000 and 675 cm·. Ge crystals are suitable for both acidic and basic solutions.
Optical unit	The optical unit is a sealed tube which contains an aluminum base supporting two mirrors. The input mirror directs the beam from the IR spectrometer into the ATR crystal. The output mirror collects the IR energy as it exits the crystal and directs the energy to the detector in the IR spectrometer The optics tube is connected to the purge system in the IR spectrometer. This design maintains a controlled environment around the IR beam as it travels through the ATR accessory and eliminates water and carbon dioxide peaks in the ATR spectra.

Liquid holder	The liquid holder contains liquid samples for maximum coverage of the crystal surface. The liquid holder is recommended for analyzing liquids with the Smart OMNI-Sampler. The holder mounts on the accessory housing. A rubber o-ring located on the bottom of the holder simplifies cleanup by preventing liquids from seeping under the holder.
Optional Lightning viewer	The Lightning Viewer is an optional pressure device that allows you to see the compressed sample during data collection. The sampling area can be magnified up to 8.SX to help you manipulate and accurately position small samples. The Lightning Viewer's hinged mounting arm allows access to the crystal for sample installation and maintenance. It's pressure control provides the same reproducible, fail-safe compression as the standard pressure tower. The durable sapphire window at the base of the Lightning Viewer accommodates a wide range of solid and liquid samples.

Operating precautions

The crystal is an important component of the OMNI-Sampler optics and should be handled with care. Cracks, chips or clouding of the crystal surface will degrade the accessory's performance.

To maximize the life of your crystal:

- Make sure the samples you analyze will not react with the crystal.
- Use only recommended solvents to clean the crystal.
- If you want to analyze liquids with the OMNI-Sampler, heed the precautions on the next page.

See the list at the left for crystal characteristics and compatibility information.

Characteristics of Gernanium (Ge) Crystals

Characteristics	Description
Refractive index	4.0
Density (g/cm)	5.32
Hardness (Knoop #)	1150
Useful pH range	1 to 14
Physical characteristics	hard and brittle, sensitive to temperature
Recommended cleaning agents	alcohol, water, toluene
Solvents that attack Ge	hot sulfuric acid, (H2SO4), aqua regia

Precautions for analyzing liquids

Applying extremely hot or cold liquids may crack the crystal. Do not submerge the crystal or place it in an ultrasonic bath.

Liquid samples are placed directly onto the ATR crystal. The liquid holder is recommended for analyzing liquids with the OMNI-Sampler to ensure maximum coverage of the crystal surface.

Germanium crystals are fairly inert but will react with some chemicals and are sensitive to abrupt changes in temper-ature. Also, the standard o-ring for the liquid holder is made from Viton®. Viton has excellent chemical resistivity to petroleum products and most solvents but reacts with some chemicals.

Make sure your sample will not react with the crystal material or the o-ring on the liquid holder.

Operating the pressure device

When analyzing solids with the Smart OMNI-Sampler, you must install either the standard pressure tower or the optional Lightning Viewer. These pressure devices are used to achieve uniform contact between a solid sample and the ATR crystal.

Heed the precaution described at the left to avoid damaging the crystal when using the pressure tower or Lightning Viewer.

Do not let the pressure point fall onto the crystal.

Be certain the pressure is fully released before using the hinge to reposition the pressure device

OMNIC Software

Thermo Scientific's OMNIC Software is an advanced software package for FT-IR spectroscopy that you can run using Windows.

With OMNIC you can perform a wide range of tasks, from collecting infrared spectra to performing quantitative analysis. The commands needed to collect and process spectra are conveniently arranged in menus and can also be entered from the keyboard.

System performance

Run the performance test on your spectrometer at least once a week to verify your system's performance without an accessory installed.

See the documentation that came with your spectrometer for instructions on how to check individual spectrometer components.

Installing the Smart OMNI-Sampler

If the performance test results are acceptable, follow the instructions at the left to install the Smart OMNI-Sampler in the sample compartment of your Nicolet Series spectrometer. The accessory fits into guides on the side walls of the sample compartment.

These accessories are aligned at the factory and they require no further adjustment.

The optical components are mounted in a sealed tube, which automatically connects to the purge system in your infrared spectrometer.

How to install the Smart OMNI-Sampler

1. Make sure the spectrometer is turned on.
2. If the sample compartment cover is attached, remove it.
3. If the side wall adapters are in place inside the sample compartment, remove them.
4. If you were using any of the connectors at the hack of the sample compartment, remove the cables.
5. Remove the Snap-in baseplate or any other accessories installed inside the sample compartment.
6. Lower the accessory into the spectrometer sample compartment and press gently downward until the accessory locks in place.

Installing the pressure tower

In order for you to see features in an infrared spectrum that is collected through an ATR accessory, the sample must be in intimate contact with the ATR crystal. You can use either the pressure tower or the optional Lightning Viewer to achieve the necessary contact.

Follow the instructions to install the pressure tower. If you want to install the Lightning Viewer instead, skip to the section titled "Installing the Lightning Viewer."

How to install the pressure tower

Read the instructions in this tutorial about installing samples and operating the pressure tower before attempting to use it or you may damage the crystal.

1. Raise the pressure point all the way up by rotating the pressure control counter clockwise.

   Do not let the tower fall onto the crystal.
2. Align the pin on the bottom of the tower base with the alignment hole on the OMNI-Sampler sampling plate.
3. Insert the two socket screws (provided) and tighten them with the 9 64 alien key.

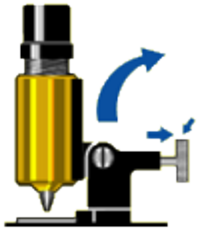
Changing the pressure tip

The standard pressure tower includes two tip styles that can be used to maximize contact between the sample and crystal.

Use the pointed tip to sample solids that have a flat surface.

The concave tip provides better contact with curved solids, such as a tablet or polymer bead.

Follow the instructions at the left if you need to change the tip installed on the pressure tower.



How to change the pressure tip

1. Raise the pressure point all the way up by rotating the pressure control counter clockwise.
2. Tilt the pressure tower away from the sampling area.

   Pull out the silver release knob at the back of the pressure tower until you feel the tower disengage.

   Hold out the knob while you tilt the tower away from the sampling area.

   Release the knob when you feel the tower engage in the back position.
3. Select an appropriate pressure tip.

   Use the pointed tip to sample solids that have a flat surface. The concave tip works best for curved solids, such as a tablet or polymer bead.

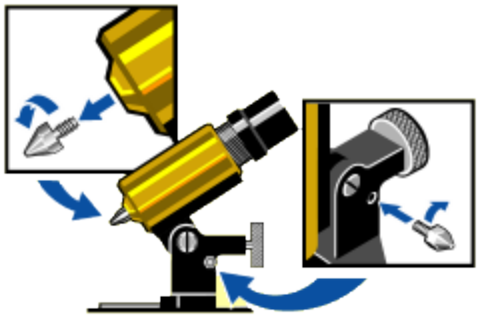
We provide convenient storage for unused tips in the pressure tower base. To remove or replace a tip, simply screw the tip in or out of the base.

4. Install the pressure tip

   Do not use tools to install or remove a pressure tip. Using tools may damage the tip.

   Do not overtighten the tips.

   If a tip is currently installed on the pressure tower, remove it. To remove a tip, use your fingers to turn the tip counter clockwise until it is free of the tower. Gently screw the unused tip into one of the storage holes in the base of the pressure tower.



Installing the Lightning Viewer

In order for you to see features in an infrared spectrum that is collected through an ATR accessory, the sample must be in intimate contact with the ATR crystal. You can use either the pressure tower or the optional Lightning Viewer to achieve the necessary contact.

Follow the instructions to install the Lightning Viewer. If you want to install the pressure tower instead, refer to the section titled "Installing the Pressure Tower" earlier in this tutorial.

1. Raise the pressure point all the way up by rotating the pressure control counter clockwise.

   Read the instructions in this tutorial about installing samples and operating the Lightning Viewer before attempting to use it or you may damage the crystal.

2. Align the pin on the bottom of the Viewer base with the alignment hole on the sampling plate.

   Do not let the tower fall onto the crystal.

3. Insert the two socket screws (provided) and tighten them whith the 9/64 allen key.

Installing the liquid holder

The liquid holder is used to measure liquids by ATR.

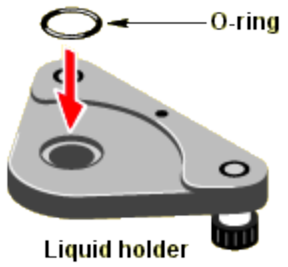
The holder keeps the sample from flowing over the edges of the crystal and allows you to form a continuous film over the crystal surface. The sample volume for the liquid holder is 1.86 milliliters.

How to install the liquid holder

1. Fit the o-ring into the groove on the under side of the liquid holder.

   Make sure the o-ring will not react with the the sample material.

   The o-ring should be flexible and smooth and slip easily into the groove. If the o-ring is stiff or cracked, it should be replaced. Replacement o-rings are available from Thermo Fisher Scientific.



2. Align the pin on the bottom of the liquid holder with the alignment hold on the sampling plate.

   Do not use a screwdriver to tighten the thumbscrews. Do not overtighten the screws.

3. Insert the two captive thumbscrews and tighten the screws by hand.

O-ring compatibility

O-ring Compatibility The standard o-ring for the OMNI-Sampler liquid holder is made from Viton®. Viton has excellent chemical resistivity to petroleum products and solvents. We do not recommend exposing the o-ring to the following chemicals:

- hot hydrofluoric or chlorosulfonic acids
- low molecular weight esters

- nitrohydrocarbons
- ketones
- amines
- ethers
- acetone

Do not use the OMNI- Sampler to analyze these materials or solutions that contain them.

*Viton is a registered trademark of DuPont.

Opening an experiment

When you install a Smart Accessory, the system automatically opens the experiment files that are associated with the accessory.

Each experiment file contains a complete set of parameters, which have already been optimized for collecting data with the accessory. There is no need for you to set the parameters individually.

How to select the default experiment

After you install a Smart Accessory, its name and the title of its associated experiment are displayed in a dialog box.

How to select from a list of experiments

If multiple experiments exist for the accessory, a list box is provided so you can select the experiment you want to open.

Click the arrow in the list box to see the titles of the experiments for the currently installed accessory.

Choose a title to select the experiment.

How to set the background option

If you collected a background spectrum before installing your OMNI-Sampler, the following option appears in the Smart Accessory Experiment Change dialog box.

This option lets you associate the current background with the new experiment.

Leave the check box blank if you plan to collect a new background (recommended). The current background spectrum will be deleted.

When you are finished selecting the experiment and setting the background option, choose OK to close the Experiment Change dialog box.

Running the performance test

After a Smart Accessory is installed, the system automatically runs a series of diagnostic tests to evaluate its performance with the new accessory.

The spectral quality checking features of your OMNIC software specify the criteria used for the performance test.

The performance diagnostics continue working in the background while the accessory is installed, ensuring high quality spectra time after time.

Performance test passed

The performance lest starts automatically when you are finished opening an experiment. When the lest is completed, a dialog box shows you the results.

Look for the check mark in the green box, which tells you the system passed the performance test and is ready to collect data.

Performance test failed

If the system does not meet the performance criteria (it won't if you didn't install a sampling plate), a message appears along with instructions on how to verify and fix the problem.

Choose Explain for in-depth information about what went wrong. When you are finished with this dialog box, choose Close.

Rerunning the performance test

The next screen indicates that a problem occurred with the performance lest and allows you lo restart the lest. Follow the instructions lo correct the problem. Then choose Redo Test lo rerun the performance lest.

Make sure a sampling plate is installed on the OMNI-Sampler and then choose Redo Test.

Measuring the background

A background spectrum is needed to process the sample data to an infrared spectrum. The background is a reference spectrum which accounts for the unique optics of the spectrometer and sampling accessory. Each sample spectrum is ratioed against a background so that the final spectrum is free of these features.

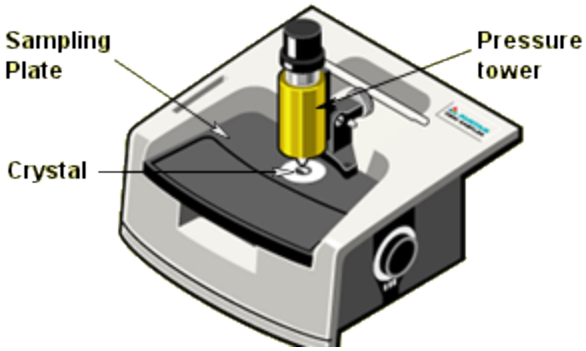
Follow the steps at the left to collect a background spectrum for this experiment. The sampling plate must be installed on the ATR accessory when the background is measured. DO NOT place a sample on the crystal when measuring the background.

Use the Collect Background command in the OMNIC Collect menu or the Collect Background button on the toolbar to measure the background.

How to collect a background spectrum

1. Make sure the sampling plate is mounted on the OMNI-Sampler accessory.

   Do not place a anything on the crystal when measuring the background. Make sure the pressure tower or Lightning Viewer is not touching the crystal.



2. Collect a background spectrum.

   Use lhe Collect Background command in the OMNIC Collect menu or choose the Collect Background button on the toolbar, if it is displayed.

   The quality of the sample spectra you collect will be enhanced if the sample spectra are processed with an appropriate background.

How to collect a representative background

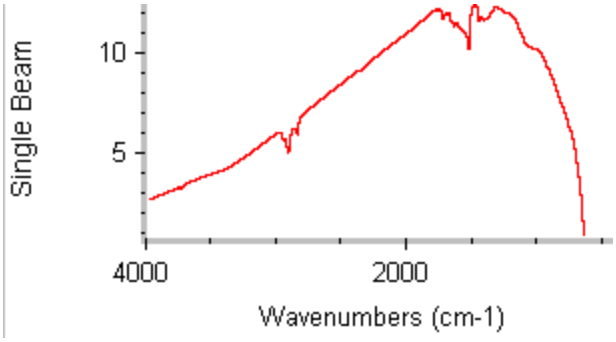
Other than Gain, Final Format, Corrections and Number Of Scans, the parameter settings used for the background and sample measurements should be exactly the same. (The settings for the Resolution and Velocity parameters must be the same.)

If you loaded the OMNI-Sampler experiment, all of the data collection parameters have been properly set for collecting background and sample data with your Smart OMNI-Sampler accessory. If you are using another experiment, use the Experiment Setup command in the OMNIC Collect menu to display the Experiment Setup dialog box. Then check the parameters on each of the experiment tabs to make sure they are set to appropriate values for your ATR experiments.

Background spectrum

The background spectrum remains in memory and is selected as the current background. It will be used to process all of the sample spectra you collect until you replace it by collecting another background.

Here is a background spectrum collected with the OMNI-Sampler:



When to collect a new background

The background data used to process each sample measurement to an IR spectrum must be measured under exactly the same conditions as the sample. For best results, we recommend collecting a background spectrum before each sample.

If you use the same sampling technique and instrument settings to analyze all of your samples, you can use the same background to process multiple samples. However, we recommend

collecting a new background at least once every two hours. If any of the following conditions are true, remeasure the background immediately.

If one of the following statements is true, you should immediately remeasure the background and use the new background to process your sample data.

- You changed a component in your spectrometer or sampling accessory (especially the ATR crystal).
- You changed one of the Collect, Bench or Advanced settings in the selected experiment (except Gain, Final Format, Number ofScans or Correction).
- You see a change in the amount of water or carbon dioxide bands in the IR spectra of your samples.
- You see an unexpected change in the spectral baseline.
- The quality of your spectral data is reduced (more noise or spurious peaks in the spectrum).

Installing a sample

When background collection is completed, you are ready to insert the sample.

Installing a solid sample with the pressure tower

ATR is an excellent technique for measuring the composition of bulk solids or the surface properties of a layered solid. The IR beam from an ATR accessory migrates only a short distance from the surface of the crystal. Because of this, the sample must be placed firmly against the crystal before any sample information will appear in the infrared spectrum.

This does not mean that you simply place the sample on the crystal so that it touches in one or two places. It means you must add pressure so that the surface of the sample conforms to the surface of the crystal. Follow the instructions at the left to accomplish this using the pressure tower.

How to install a solid sample with the pressure tower

1. Make sure the pressure tower is installed on the OMNI-Sampler.
2. Rotate the pressure control counter clockwise to raise the pressure point all the way up.

3. Make sure the proper tip is installed on the pressure tower.

   Use the pointed tip to sample solids that have a flat surface. The concave tip provides better contact with curved soids, such as a tablet or polymer bead.

4. Place the sample in the center of the crystal, directly under the pressure point.

   For best results, the sample should cover the crystal completely (required for quantitative analysis).

   The pressure tower cannot be used to analyze samples that are thicker than 8 millimeters.

5. Rotate the pressure control clockwise to press the sample against the crystal.

   When you reach maximum pressure, the pressure control begins to click with each additional turn.

   You dont have to worry about damaging the crystal by applying too much pressure. The pressure tower automatically determines when the correct pressure is applied and prevents further compression.

Installing a solid sample with Lightning Viewer

ATR is an excellent technique for measuring the composition of bulk solids or the surface properties of a layered solid. The IR beam from an ATR accessory migrates only a short distance from the surface of the crystal. Because of this, the sample must be placed firmly against the crystal before any sample information will appear in the infrared spectrum.

This does not mean that you simply place the sample on the crystal so that it touches in one or two places. It means you must add pressure so that the surface of the sample conforms to the surface of the crystal. Follow the instructions at the left to accomplish this using the Lightning Viewer.

How to install a solid sample with the Lightning Viewer

1. Make sure the Lightning Viewer is installed on the OMNI-Sampler.
2. Rotate the pressure control counter clockwise to raise the pressure point all the way up.

   The Lightning Viewer's pressure point is a sapphire window.

3. Place the sample in the center of the crystal, directly under the pressure point.

   For small samples, you can position while viewing.

For best results, the sample should cover the crystal completely (required for quantitative analysis).

The Lightning Viewer cannot be used to analyze samples that are thicker than 16 millimeters.

4. Rotate the pressure control clockwise to press the sample against the crystal.

   When you reach maximum pressure, the pressure control begins to click with each additional turn.

   You dont have to worry about damaging the crystal by applying too much pressure. The Lightning Viewer automatically determines when the correct pressure is applied and prevents further compression.

Installing a liquid sample

ATR is an ideal technique for analyzing liquids. Sample preparation is minimal and cleanup is easy and fast. Even highly absorbing liquids, such as aqueous solutions, can be measured accurately without dilution because the IR beam penetrates the sample only a tiny amount.

Liquids are placed directly on the ATR crystal for analysis. Small amounts can be injected using a dropper or syringe. A special attachment is provided for measuring larger volumes (required for quantitative analysis of liquids).

Make sure your sample will not react with the crystal o-ring.

How to install a liquid sample

1. Make sure the liquid holder is installed on the accessory.
2. Place the sample in the liquid holder.

   The liquid should be at or close to room temperature. Applying extremely hot or cold liquids may crack the crystal.

   For free-flowing liquids, use a dropper or syringe to form a thin film of sample on lhe crystal (about 5 to 7 drops for polar liquids; 1 drop for nonpolar liquids).DO NOT overfill the holder.

If the sample is viscous, use a rubber spatula to spread the sample over the surface of the crystal. For best results, the sample should cover the crystal completely (required for quantitative analysis).

Measuring the sample

Once the sample is positioned on the crystal, you are ready to start collecting the sample data. The sample measurement will show how the energy you started with was reduced by the sample.

Use the Collect Sample command in the OMNIC Collect menu to start data collection. Then follow the instructions displayed on your screen to measure the sample.

The instructions that appear will differ depending on how the Background Handling and other parameters and options are set in OMNIC and in the selected experiment.

How to collect a sample spectrum

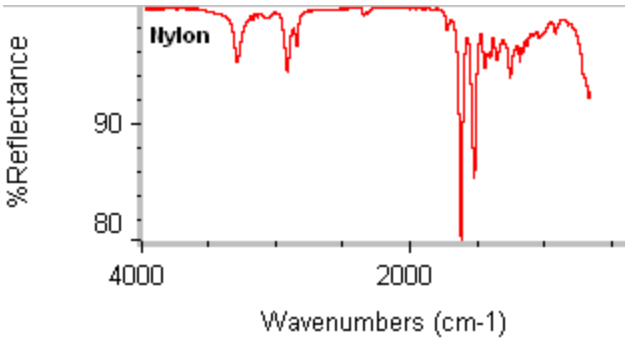
Use lhe Collect Sample command in the OMNIC Collect menu or choose the Collect Sample button on the toolbar, if it is displayed, to start sample collection.

When % Reflectance is selected as the final format of your sample spectra-that's how it's set up in the standard OMNI-Sampler experiment-OMNIC collects a few scans and then calculates and displays a reflection spectrum. The spectrum is updated as new data are collected.

When the system has finished collecting the number of scans specified in the experiment, the final spectrum is displayed in a window.

The final spectrum shows only the change in IR energy (the background energy has been removed).

This is a spectrum of a nylon washer measured using the OMNI-Sampler.



Optimizing the spectrum of a solid

If you are measuring a solid sample and the spectral bands are very small (this happens occasionally with samples that are extremely rigid or if the sample surface is very rough), reposition the sample to ensure good contact directly below the pressure point. Then restart data collection.

If the sample spectrum has no sample peaks, check that the sample material absorbs energy in the infrared region of the spectrum.

If you see extra peaks in the spectrum, clean the crystal (see Cleaning Up in this tutorial) and collect the sample spectrum again.

If the peaks in the spectrum of a solid sample are small, reposition the sample and collect the spectrum again. To reposition the sample, raise the pressure point on the pressure tower or Lightning Viewer by rotating the pressure control counter clockWise. Then position the sample in the center of the crystal, directly under the pressure point. Lower the pressure point and restart sample collection.

Optimizing the spectrum of a liquid

If you see extra peaks in the spectrum of a liquid, residual material from the previous sample may have been left on the crystal.

The extra peaks could also be from sample material that has built up around the o-ring seal. This happens occasionally with certain sample types and after repeated use.

Keep in mind, however, that the o-ring is located outside the active infrared area and the o-ring material is fairly inert. It should not interfere with the analysis under normal conditions.

If you see extra peaks in the spectrum of a liquid sample, clean the crystal (see Cleaning the Crystal in this tutorial) and then collect the sample spectrum again. If extra peaks still appear, remove the liquid holder and clean it thoroughly (see Cleaning the Liquid Holder in this tutorial). Be sure to remove and clean the o-ring as well as the groove on the underside of the holder. Then replace the o-ring and holder, insert a fresh sample and restart data collection.

Cleaning up

Remove the sample immediately after you finish the analysis.

If any sample material remains on the crystal, remove the sampling plate and clean the plate and crystal thoroughly before measuring another sample (see the instructions at the left).

You can clean the crystal with soap and water or with a suitable solvent. The crystal must be cleaned gently using soft material.

When the crystal is clean and dry, you are ready to continue measuring samples.

How to clean the crystal between samples

1. If you were measuring a solid sample, raise the pressure point and remove the sample.

   Rotate the pressure control counterclockwise to raise the point.

   Do not leave the sample on the crystal overnight.

2. Tilt back the pressure tower or Lightning Viewer.

   Be certain the pressure is fully released before using the hinge to reposition the pressure device.

   Pull out the silver knob located at the back of the pressure device.

   You will feel it disengage. This allows you to til the pressure device out of the way.

   You can use a cotton swab or compressed air to remove small particles from the crystal.

   Reverse the steps above to lower the pressure device back into the sampling position.

3. If you were measuring a liquid sample, remove most of the sample by dabbing it with unscented tissues or cotton.

4. Clean the crystal.

   Moisten a tissue or cotton ball with water, or soap and water, and use it to clean the crystal. Dry the crystal with unscented tissue or cotton.

   The cleaning fluid should be at or close to room temperature (or the temperature of the previous sample). Applying extremely hot or cold liquids may crack the crystal.

If you need to use a solvent to remove the sample, make sure you select a solvent that is compatible with the crystal.

The following solvents are recommended for cleaning a germanium crystal:

- alcohol
- water
- toluene

Use only recommended solvents to clean the crystal.

The cotton or tissue may be moistened with a suitable solvent, if necessary, to remove the sample. If you clean the crystal with a solvent, allow enough time for the solvent to evaporate completely. To ensure complete evaporation, dry the crystal with clean, dry air or nitrogen.

Cleaning the liquid holder

The o-ring on the underside of the liquid holder is located outside the active infrared area and the o-ring material is fairly inert. It should not interfere with the analysis under normal conditions.

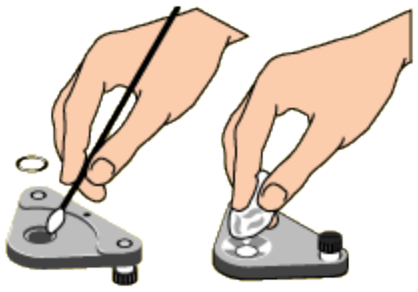
However, sample material can build up around the o-ring seal when measuring certain sample types or with repeated use.

Follow the instructions at the left to remove and thoroughly clean the liquid holder and o-ring when necessary to prevent contamination between samples and after measuring the last sample for the day.

How to clean the liquid holder

1. Remove the liquid holder by loosening the two thumbscrews.
2. Pull out the o-ring from the underside of the liquid holder.
3. Clean the holder and o-ring.

   Use soap and water or alcohol to clean the o-ring and liquid holder, especially the groove on the underside. Dry them thoroughly with a clean tissue or towel.



To clean the plate and crystal

Follow the instructions at the left to clean the sampling plate and crystal. They should be cleaned thoroughly when necessary to prevent contamination between samples and after measuring the last sample.

1. Use soap and lukewarm water, alcohol, or toluene to wash the sampling plate and crystal.

Dry them with unscented tissues or cotton. If you clean the crystal with a solvent, allow enough time for the solvent to evaporate completely. To ensure complete evaporation, dry the crystal with clean, dry air or nitrogen.

Use only recommended solvents to clean the crystal.

Removing the Smart OMNI-Sampler

You can remove the OMNI-Sampler accessory as easily as you installed it. Follow the instructions at the left.

When not in use, your accessory should be stored in a dust-free environment such as a cabinet or box.

1. If a sample is positioned on the sampling plate, remove the sample.
2. Gently pull up on the accessory to release it.

Continue lifting the accessory straight up until it is completely free of the sample compartment.

3. Open an experiment.

   After you remove a Smart Accessory, a dialog box appears allowing you lo select the experiment for your next analysis.

   Click the arrow in the listbox to see the titles of the experiments available in OMNIC.

   Select a title to open the experiment

Where to go next

Your OMNIC software includes on-line documentation for many different FT-IR sampling techniques. If you are interested in learning more about ATR, open the Sampling Techniques option in the OMNIC Help menu and then choose ATR Sampling Techniques. It explains the theory of ATR spectroscopy and gives tips on running quantitative experiments and spectral searches using ATR data. It also discusses common problems with ATR experiments and how to solve them.

If you need information on another sampling technique or accessory, open Sampling Techniques from the OMNIC Help menu and then choose the technique or accessory name.