Smart Multi-Bounce HATR

This user guide introduces the Multi-bounce HATR Smart Accessory for Thermo Scientific's Nicolet Series Fourier Transform Infrared (FT-IR) spectrometers. The Multi-bounce HATR is designed for fast, easy horizontal attenuated total reflectance (HATR) analyses using a multi-bounce crystal in the standard crystal configurations.

Run this tutorial to learn the basics of HATR sampling with your spectrometer. It explains step by step how to install the Multi-bounce in the sample compartment and use the accessory to analyze liquids, powders and solids. You will also learn how to properly maintain and store the accessory.

Product features

The Smart Multi-bounce HATR is Thermo Scientific's general-purpose sampling accessory for basic ATR analyses. This accessory offers the throughput, ruggedness and stability needed for most quality control and research applications using the typical crystal configurations. The crystal configuration can be changed in one quick step with no optical realignment.

The Multi-bounce HATR is designed for fast analysis of liquids, solids, semi-solids and soft powders using the standard ATR technique.

Crystal features

The Smart Multi-bounce HATR is designed to accommodate crystals that allow multiple internal reflections. The higher the number of reflections, the more absorbance information that can be obtained from the sample and the more sensitive is the measurement. This means you can analyze components that are present in the sample in small amounts (0.1% detergent in water, for example) and materials that are strong IR absorbers.

The term "horizontal" refers to the position of the crystal surface. A horizontal crystal allows you to analyze a wide range of sample types, such as liquids, gels, pastes, powders and solids, with no special preparation.

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Smart accessory features

The Smart Multi-bounce HATR 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 tutorials.

Product specifications

Multi-bounce HATR specifications

The Multi-bounce HATR with standard zinc selenide (ZnSe) crystal features:

- Angle of incidence: 45°
- Refractive index: 2.4 @1000 cm·
- S1>ectral range: 4000 -
- 650 cm·
- Number of reflections: 1 O
- Depth of penetration: 2 micrometers ot 1ooo cm (assumes RI of sample is 1 .5 @ 1000 cm)
- Effective pathlength: 1 0.1O micrometers

- Useful pH range: 5 to 9
- Liquid sample volume: 0.5 milliliters

Crystal specifications

Thermo Fisher Scientific offers two commonly used crystal materials for the Multi-bounce HATR, zinc selenide (ZnSe) and germanium (Ge). Both crystals have a 45 degree angle of incidence. The crystal material determines the spectral range for the analysis and the depth of penetration that can be achieved with a particular sample. The lower the crystal's refractive index, the deeper the IR energy penetrates the sample and the more absorption that occurs.

The angle of incidence refers to the angle of the IR beam's first reflection after it enters the crystal. Increasing the angle of incidence reduces penetration.

Zinc Selenide (ZnSe) Crystals

Specification	Value
Refractive index	value
Spectral range	value
Useful pH range	value
Critical range	value

Sampling characteristics

- angle of incidence: 45
- # of reflections
- Depth of penetration

The experimental sampling depth is 2 to 3 times the calculated depth of penetration. Assumes refractive index of sample is 1.5 @ 1000cm.

Germanium (Ge) Crystals

Specification	Value
Refractive index	value
Spectral range	value
Useful pH range	value
Critical range	value

Sampling characteristics

- angle of incidence: 45
- # of reflections: 10
- Depth of penetration: 0.6 micrometers

The experimental sampling depth is 2 to 3 times the calculated depth of penetration. Assumes refractive index of sample is 1.5 @ 1000cm.

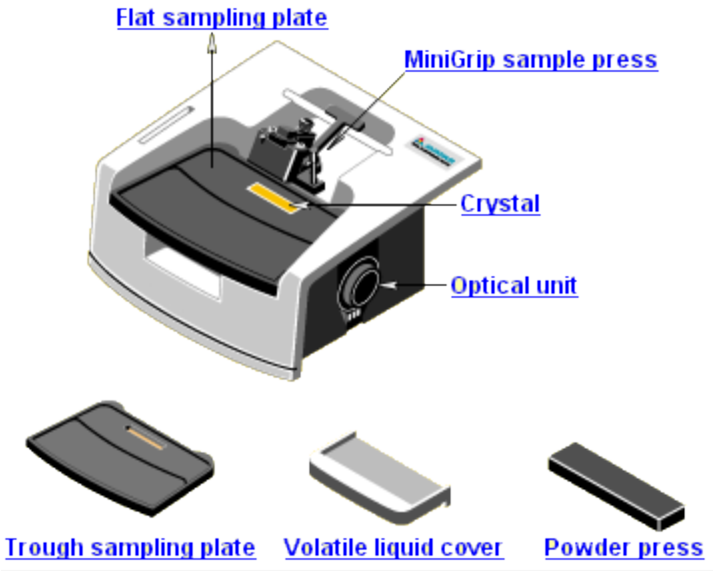
Product components

Multi-bounce HATR components

The Multi-bounce HATR's efficient collection optics and interchangeable crystal design offer impressive, repro-ducible performance for both research and analytical testing applications. The accessory provides two sampling configurations for each crystal material:

- A flat plate for sampling solids and semi-solids.
- A trough plate for sampling liquids, gels and powders.

The accessory includes a MiniGrip sample press for pressing solids against the crystal, a powder press to ensure even contact for powder samples and a trough cover for analyzing volatile liquids.



Component	Description
Flat sampling plate	The flat sampling plate supports an ATR crystal so the surface of the crystal is level with the surface of the plate. The flat plate is used to measure solid and semi-solid samples that! have a flat, smooth surface. The sampling plates are fully sealed and coated with plastic to protect them from sample materials that may be corrosive.
MiniGrip sample press	The MiniGrip is a mechanical press used to achieve uniform contact between the sample and the ATR crystal. The MiniGrip mounts on the accessory housing so that it sits above the sampling plate. The MiniGrip press can be used with both the flat and the trough sampling plates.
Crystal	The crystal causes the IR beam to bend and be reflected from its internal surfaces, producing a series of evanescent waves. ATR crystals are made from IR-transmitting materials that have a high index of refraction. The standard zinc selenide (ZnSe) crystal has a refractive index of 2.4 and an angle of incidence of 45 degrees. The depth of penetration is approximately 2 micrometers. The crystal is about 5 cm long and produces 10 internal reflections

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.
Trough sampling plate	The trough sampling plate has a trough or well in the center. The plate supports an ATR crystal so the surface of the crystal is level with the bottom of the trough. The trough plate is used to measure materials that need to be contained, such as free-flowing liquids, gels, pastes and powders. The trough plate holds a sample volume of 0.5 milliliters.
Volatile liquid cover	The volatile liquid cover is a metal plate that can be placed over the trough when you are measuring volatile liquids. The cover prevents the sample from evaporating during the analysis.
Powder press	The powder press is a hard plastic insert that is placed on the surface of a powder sample before lowering the MiniGrip compression plate. The MiniGrip/powder press combination provides uniform pressure to powdered samples. We recommend using the MiniGrip and powder press whenever you analyze powder samples.

Operating precautions

Maintaining the crystal

Maintaining the crystal

The crystal is an important component of the Smart Multi-bounce HATR 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 cause a reaction with the crystal material.
- Use only recommended solvents to clean the crystal.

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

Zinc Selenide (ZnSe) Characteristics

Characteristic	Value
Refractive index @ 1000 cm	2.4
Density (g/cm)	5.27
Hardness (???)	150
Useful pH range	5 to 9
Physical characteristics	hard, brittle
Recommended cleaning agents	alcohol, acetone, water
Solvents which attack ZnSe	strong acids and alkalis, oxidizing agents, chlorinated solvents such as methylene chloride and chloroform

Germanium (Ge) Characteristics

Characteristic	Value
Refractive index @ 1000 cm	2.4
Density (g/cm)	5.27
Hardness (???)	150
Useful pH range	5 to 9
Physical characteristics	hard, brittle
Recommended cleaning agents	alcohol, acetone, water
Solvents which attack ZnSe	strong acids and alkalis, oxidizing agents, chlorinated solvents such as methylene chloride and chloroform

Precautions for the MiniGrip

In order for you to see features in an infrared spectrum that is collected through an ATR accessory, the sample must be in close contact with the ATR crystal. The MiniGrip sample press is used to apply pressure to solids, semi-solids and powders so that the required contact can be achieved.

Heed the precautions described at the left to avoid damaging the crystal when using the MiniGrip.

When using the MiniGrip, observe the following precautions:

- Do not lower the compression pad on the bare crystal.
- Do not apply pressure to the crystal for extended periods oftime.
- Do not use the MiniGrip to press a sample that has an uneven surface.

- Make sure the thickness control is properly set and the pressure control is at its lowest setting before you lower the compression pad.

Precautions for analyzing liquids

Liquid samples are simply poured or injected directly onto the crystal.

The trough sampling plate is required for analyzing liquids. A cover is provided to seal volatile liquids in the trough to prevent evaporation during the analysis.

Follow the precautions described at the left to avoid damaging the crystal when analyzing liquids.

Make sure your sample will not react with the crystal material. Click here for compatibility information.

Applying extremely hot or cold liquids may crack the crystal.

Do not submerge the crystal or place it in an ultrasonic bath.

Compatibility information for ATR crystals

Do not attempt to analyze the following materials. They will attack the ATR crystal.

Crystal material	Sample materials to avoid
ZnSe	strong acids and bases, oxidizing agents, chlorinated solvents, such as methylene chloride and chloroform
Ge	Hot sulfuric acid (H SO..), aqua regia

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.

For instructions on starting OMNIC, refer to the box at the left.

How to start OMNIC Software

The methods you can use to start OMNIC depend on the version ofWindows you are using.

Click here to learn how to start OMNIC.

For information on other methods ofstarting applications and more detailed instructions on using Windows features, see your Windows documentation.

After you start OMNIC, the OMNIC window appears on the display.

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 or click here to learn how to check individual spectrometer components.

Installing the Multi-bounce HATR

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

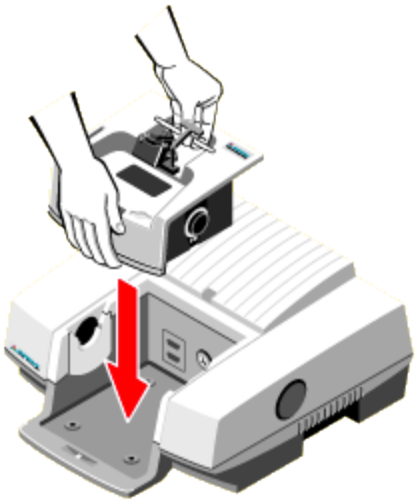
These accessories are aligned at the factory and they require no further adjustment.

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

To install the Smart Multi-bounce HATR

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 back of the sample compartment, remove the cables.
5. Remove the Snap-in baseplate or any other accessories installed inside the sample compartment.
6. Insert the accessory. Lower the accessory into the spectrometer sample compartment and press gently downward until the accessory locks in place.



Installing a sampling plate

Thermo Fisher Scientific offers two kinds of sampling plates for each crystal type, a flat plate for measuring solids and a trough plate for measuring liquids and powders.

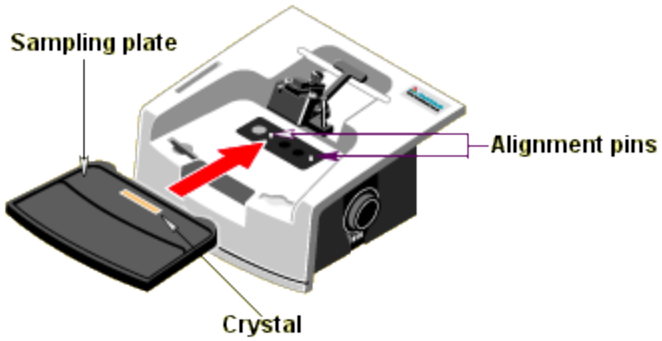
- Flat plate
- Trough plate

Follow the instructions at the left to install a sampling plate on the Multi-bounce HATR accessory.

To install a sampling plate

Position the sampling plate with the crystal facing up and slide the plate onto the Smart Multi-bounce HATR as shown below.

The two small alignment holes on the bottom of the sampling plate fit over the pins on the accessory surface.



Installing a MiniGrip

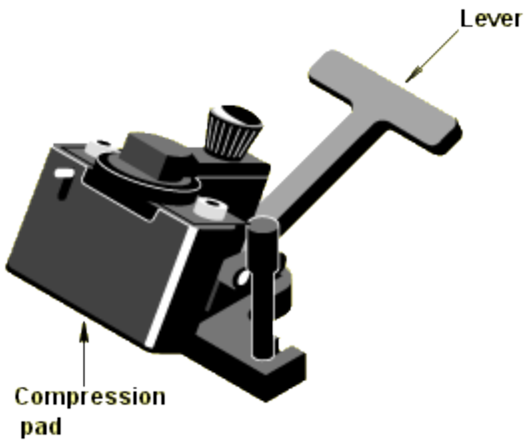
In order for you to see features in an infrared spectrum that is collected through an ATR accessory, the sample must be in close contact with the ATR crystal. The MiniGrip clamp is used to apply pressure to solids and powders so that the required contact can be achieved.

The MiniGrip is required for all solids and

Important: Read the instruction in this tutorial on installing samples and operating the MiniGrip before attempting to use it or you may damage the crystal.

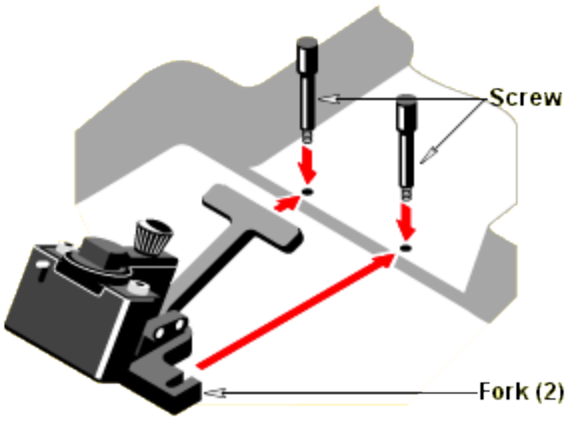
To install the MiniGrip

1. Make sure the MiniGrip compression pad is in the raised position by lowering the lever.



2. Partially insert the two long screws into the holes on the top of the accessory housing.

3. Slide the forks on the base of the MiniGrip onto the screws and tighten the screws finger tight.



To remove the MiniGrip, loosen the screws and slide the MiniGrip forward.

Operating the MiniGrip

The MiniGrip has a couple of moving parts. The picture at the left explains how they work.

Use the lever to raise and lower the compression pad.

The thickness control allows you to open and close the spacer.

Use the pressure control to adjust the pressure that will be applied when the compression pad is down.

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.

To select the default experiment file:

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

To select from a list of experiment files:

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

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

Click a title to select the experiment.

To select the background options:

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

To use the current background:

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.

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.

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

To collect a background spectrum

1. Make sure the correct sampling plate and crytsal are mounted on the Multi-bounce HATR accessory.

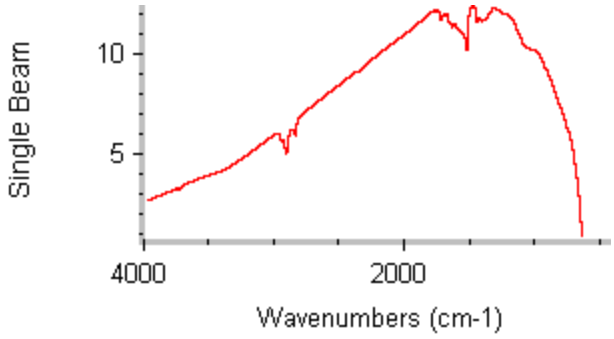
   Do not place anything on the crystal when measuring the background. If you will be using the MiniGrip, make sure the compression pad is not touching the crystal.

2. Collect a background spectrum

   Use lhe Collect Background command in the OMNIC Collect menu or click 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. Click here for tips on collecting representative backgrounds.

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.



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.

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.

Click a sample type in the box at the left to find out how to insert your sample on the ATR crystal.

Installing a solid sample

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 show up 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. The instructions at the left show how to accomplish this with solids.

To install a solid sample

1. Make sure a flat sampling plate with an appropriate crystal and the MiniGrip sample press are installed on the Smart Multi-bounce HATR.

   If you need to change the sampling plate, stop and collect another background spectrum before continuing with this procedure.
2. Raise the MiniGrip compression pad by lowering the lever.
3. Minimize the pressure by turning the pressure control counterclockwise as far as it will go.
4. Set the thickness spacer to the approximate thickness of your sample.

Turn the thickness control clockwise for thin samples; turn it counterclockwise for thick samples.

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

5. Place the sample on the ATR crystal.

   The surface of the sample must be completely flat on both sides.

   For best results, the sample should cover the crystal completely (required for quantitative analysis). If the sample is too small to cover the crystal, cover the MiniGrip compression pad with aluminum foil so the pad doesn1touch the crystal when you press it against the sample (the material used to make the pad has a distinctive infrared spectrum of its own).

   Important: Pressing solids that have an uneven surface may damage your crystal.

6. If the sample thickness is 8 millimeters or less, use the MiniGrip to press the sample against the crystal.

   Lift the MiniGrip lever to lower the compression pad.

7. Tum the pressure control clockwise until the compression pad contacts the sample.

   Important: At this point, apply only enough pressure to gently press the sample against the crystal.

Analyzing thick solids

If the sample is too thick for the MiniGrip (8 millimeters or more), try using your hand to press the sample against the crystal. The quality of the resulting spectrum may be poor, however, since it is difficult to achieve even pressure across the surface of the sample without the MiniGrip.

In addition, you can't measure component concentrations in the sample if you use your hand to press the sample against the crystal because you can't apply consistent pressure from one sample to the next.

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.

The effects of uneven pressure on depth of penetration (and thus sample absorption) are not a factor when measuring liquids, because they conform to the surface of the crystal without added pressure. Since pathlength (depth of penetration) is constant, liquids can be measured reproducibly and the ATR spectra can be used for quantitative analysis.

To install a liquid sample

1. Make sure a trough sampling plate with an appropriate crystal is installed on the accessory.

   If you changed the sampling plate, stop and collect another background spectrum before continuing with this procedure.

   Important: Make sure your sample will not react with the crystal material.

2. Pour or inject the sample directly onto the crystal.

   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).

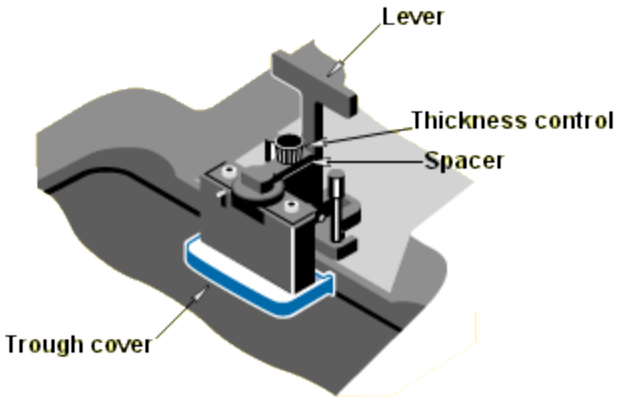
   Important: The liquid should be at or close to room temperature. Applying extremely hot or cold liquids may crack the crystal.

3. If the sample is volatile, install the MiniGrip sample press and volatile liquid cover.

   Slide the cover over the MiniGrip compression pad as shown in the illustration below.

4. Set the MiniGrip thickness spacer to the approximate thickness of the volatile liquid cover.

5. Lift the MiniGrip lever to press the cover over the sample.



Installing a powder sample

Powders are easier to run by ATR than by infrared transmission because little or no preparation is required. When analyzed by IR transmission, powders must be mixed with the proper amount of KBr (potassium bromide) and pressed into a pellet. The pellet is then placed in the IR beam. When an ATR accessory is used, the powdered sample is placed directly on the ATR crystal. A powder press is used to achieve even distribution and contact with the crystal.

The ATR technique also has some benefits over diffuse reflection because distortions due to scattering that occur in diffuse reflection spectra are not present in ATR spectra.

To install a powder sample

1. Make sure the trough sampling plate and MiniGrip sample press are installed on the accessory.

   If you changed the sampling plate, stop and collect another background spectrum before continuing with this procedure.

   Important: Make sure your powder sample will not scratch the crystal. Do not use the MiniGrip to crush a sample.

2. Raise the MiniGrip compression pad by lowering the lever.
3. Minimize the pressure by turning the pressure control counterclockwise as far as it will go.
4. Close the spacer by turning the thickness control clockwise as far as it will go.
5. Grind the sample, if necessary.

   For analysis by ATR, the particles of a powder sample should be about the same size as lhe wavelenglh of light used for the analysis. For infrared spectroscopy, this means the particle size should be less than 25 micrometers.

   If the particles are too big, use a mortar and pestle or an electric grinder to grind the sample. One to 2 minutes of grinding is usually sufficient.

   The WIG-L-BUG electric grinder, available from Thermo Fisher Scientific, is designed to grind samples to the correct particle size for ATR measurements.

6. Place the sample on the crystal.

To install a powdered sample, sprinkle a thick (1 to 3 millimeter) layer of sample on the crystal. For best results, the sample should cover the crystal completely.

If the particles are extremely hard, consider purchasing a Diffuse reflectance accessory for the analysis. Diffuse reflectance accessories often provide superior results from hard powders, which scatter much of the energy from the IR beam when measured by ATR.

7. Place the powder press over the powder.
8. Lower the MiniGrip compression pad by lifting the lever.

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.

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

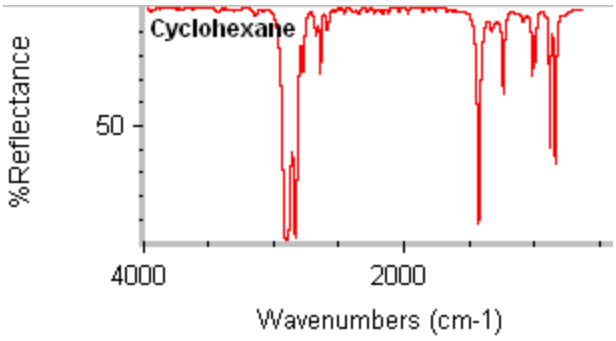
When the system has finished collecting the number of scans specified in the experiment, the final spectrum is displayed in a window.

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

To collect a sample spectrum:

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

This is a spectrum of cyclohexane measured using the standard zinc selenide (ZnSe) crystal.



Adjusting the pressure

If no spectral bands appear or the bands are very small and you are measuring a solid or powder, restart data collection. Then gradually increase the pressure applied by the MiniGrip until sample bands appear in the spectrum.

Stop increasing the pressure as soon as the bands stop getting bigger or fall in an acceptable Y-axis range.

Important: Powder samples produce weak spectra even with maximum pressure. Be careful not to break the crystal by applying too much pressure.

To adjust the pressure: If you need to increase the pressure applied to a solid sample, turn the pressure control clockwise. You can leave the compression pad down while you adjust the pressure. Increase the pressure in small increments (about 1/2 turn) and wait 3 to 4 seconds to see the effect on the spectral data.

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.

To clean the crystal

1. Remove the sample.
2. If sample material remains on the crystal, remove the sampling plate by lifting if off the alignment pins.

   Important: DO NOT leave a sample on the crystal overnight
3. Wash the crystal with soap and water an dry with unscented tissue.

Important: 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.

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.

Important: Use only recommended solvents to clean the crystal. Do not immerse the sampling plate in a cleaning fluid or you risk loosening the adhesive that bonds the crystal to the sampling plate. Do not place the sampling plate in an ultrasonic bath.

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:

Crystal	Recommended solvent
ZnSe	Alcohol, acetone, water
Ge	alcohol, acetone, water, toluene

Removing the Multi-bounce HATR

You can remove the Smart Multi-bounce HATR accessory as easily as you installed it.

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

To remove the Smart Multi-bounce HATR

1. If a sample 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 to select the experiment for your next analysis.

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

Click 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 data 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.