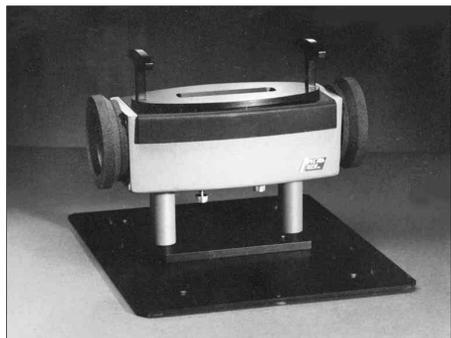




The ARK™ Attenuated Total Reflectance Kit



The ARK (Attenuated Total Reflectance Kit) is the next generation of horizontal attenuated total reflectance (HATR) accessories for FT-IR spectrometers. The ARK is the most stable, rugged, high energy throughput HATR available. For liquid and solid samples, the ARK is the ideal choice for both quality control and research laboratories. Feedback from hundreds of HATR users has resulted in the ARK design, which includes unparalleled accessory stability, complete purge capabilities and the highest performance specifications of any ATR accessory available today.

Attenuated Total Reflectance (ATR) Spectroscopy is a versatile and powerful technique for infrared sampling. It is ideal for rapid quantitative and qualitative analyses, as no preparation is required for most samples. The elimination of sample preparation not only reduces analysis time, but reduces the risk of contamination when handling a sample. ATR accessories are well-suited for highly absorbing materials that require a very short pathlength, such as aqueous samples. A typical ATR crystal has a pathlength of approximately 12 micrometers, while the smallest pathlength of a typical transmission cell is 15 micrometers. In addition, ATR is well-suited for providing information about the surface properties of a material.

The ARK has a unique design with integral purge tubes that seal the accessory from the atmosphere. The ARK sits in the FT-IR sample compartment with the cover open and maintains purge while changing samples and crystal plates. Reduction of atmospheric contributions, due to carbon dioxide and water vapor, can be important when absorption peaks of interest are obscured, and when spectral subtraction experiments are performed. The ability to maintain purge throughout the sampling process ensures the best possible sampling conditions.

Typical applications include the analysis of:

- highly (infrared) absorbing liquids
- aqueous solutions
- solvents
- hydrocarbons in solution
- rubbers
- polymer films
- soft, compressible powders

The ARK can be used for analyzing a large variety of samples including liquids, solids semi-solids and soft powders. Both trough and flat plate style crystal plates are available to suit the specific analysis. Spectra-Tech's patented crystal design ensures high energy throughput without the need for optical alignment when changing samples and crystal plates. The ARK is available with the widest variety of crystal plates in different crystal materials and angles. There is a crystal material for almost any pH sample, from sulfuric acid to sodium hydroxide solutions, and a suitable crystal angle that results in a pathlength from 0.6 to 45 micrometers. These choices permit both qualitative and quantitative analyses of a wide range of samples. The standard crystal plate with the ARK has a 45° zinc selenide crystal. This crystal is the most versatile and commonly used for ATR analyses. The ARK is available for use with most currently available FT-IR spectrometers.

The rugged trough plate is ideal for liquids and samples that need to be contained, such as soft, compressible powders. The ATR crystal is bonded in a trough-shaped plate to give leakproof, cuvette-style sampling. The flat plate is best choice for analyzing polymer films and other solid samples. Spectra-Tech's unique pressure device helps to achieve even, reproducible contact between the sample and the crystal which is necessary for quantitative accuracy. In addition, this ensures spectra that are free of artifacts (due to poor contact). An exclusive benefit of Spectra-Tech's trough and flat plates is that they are Teflon® coated to improve chemical resistivity and prevent discoloration of the plates. Discoloration and corrosion often occurs when using nickel or chrome coated sampling plates.

The ARK has a unique aluminum cast body that gives it exceptional stability and a stream-line appearance. Only minimal alignment is needed to install this accessory. No tools are required to install the ARK, simply adjust three thumb screws. This accessory has a baseplate mounting configuration for the highest level of reproducibility in sampling. These unique design features produce optimal spectral results that are required when performing quantitative measurements.

The A.R.K. HATR accessory features:

- Low-volume, sealed optical cavity for optimum purge
- Easy to grip handles on crystal plates - reduces risk of damaging crystals
- Cast aluminum body, baseplate mounted - ultimate stability and sampling reproducibility
- Teflon-coated Trough and Flat Plates - enhanced chemical resistivity
- High throughput optics - ultimate sampling detection limits
- Tool-free alignment - easy to use, minimal setup time
- Unique crystal mounting design - provides leakproof sampling

ARK CONFIGURATIONS

The ARK is available in three configurations: the ARK Trough Plate Kit, ARK Flat Plate Kit, and the ARK Combination Kit.

1 ARK TROUGH PLATE KIT

For Liquids, Pastes and Powders

The ATR crystal is bonded in a trough-shaped plate to give leakproof, cuvette-style sampling. Liquids, pastes and gels can be easily poured into and removed from the Trough Plate sampling surface. When using the Trough Plate with powders, the sample is spread out evenly across the crystal surface. The Gripper Sample Clamp and the Powder Press are recommended options to provide even pressure distribution between the sample and the crystal. When analyzing volatile liquids, the Volatile Liquid Cover reduces evaporation.

2 ARK FLAT PLATE KIT

For Solids and Films

The ATR crystal is secured to a horizontal sampling plate to provide a flat surface for the analysis of films and other solids. The combination of the sampling plate and the Pressure Device ensures even, reproducible contact between the sample and the crystal.

3 ARK COMBINATION KIT

For the Greatest Versality in Liquid and Solid Sampling

The greatest range of sample types can be analyzed with this kit. This kit includes a Trough Plate, Flat Plate, Pressure Device and Volatile Liquids Cover allowing the analysis of the widest range of samples, including liquids, powders and films. This kit is the most economical choice for a laboratory that analyzes a variety of samples.

ARK Trough Plate Kit Part Number 0055-3XX(T), Includes:

- Aluminum Cast, Base Optical Unit
- Integral Purge
- 45° Zinc Selenide Trough Plate
- Volatile Liquid Cover
- Powder Press
- Instruction Manual

ARK Flat Plate Kit Part Number 0055-3XX, Includes:

- Aluminum Cast, Base Optical Unit
- Integral Purge
- 45° Zinc Selenide Trough Plate
- Foam Pad
- Instruction Manual

ARK Combination Kit Part Number 0055-2XX, Includes:

- Aluminum Cast, Base Optical Unit
- Integral Purge
- 45° Zinc Selenide Trough Plate
- 45° Zinc Selenide Flat Plate
- Volatile Liquid Cover
- Pressure Device
- Powder Press
- Foam Pad
- Instruction Manual

THE THERMAL ARK

The Thermal ARK allows attenuated total reflection measurements at elevated temperatures. Samples such as liquids, pastes, oils, gels and films can be heated to temperatures ranging from ambient to 100°C* for thermal studies.

Typical applications include:

- transforming a difficult sample into an easier form for ATR analysis
- determining thermal stability of materials
- temperature degradation studies
- food stuffs - shelf life
- melt studies
- biological samples

This new accessory is available as either a complete Thermal ARK package or as an upgrade package to an existing ARK. The upgrade package consists of a heater plate (which contains the heating elements, Resistance Temperature Detector (RTD), insulators and safety devices) and a controller. This top plate can be installed in minutes and does not interfere with routine non-heated measurements.

An integral controller with an easy to read digital display is included in all packages. The controller has a ramp to set point feature (set in degrees per minute) to permit controlled progressive heating of the sample. A single controller configuration is offered to suit application requirements. The single controller will regulate and monitor the temperature of the heater plate. The heater plate temperature is controlled by an RTD.

The adjustable temperature ranges from ambient to 100°C and is accurate to $\pm 0.1^\circ\text{C}$. Heating time from ambient to 100°C is sample dependent but generally ranges from 5-10 minutes. Samples are easily introduced and removed when the accessory is cool.

A set of non-thermally conductive handles are included to fit on the trough sampling plate as a safety feature. The accessory is insulated to minimize any heat radiation to the sample compartment.

*Standard ARK trough plates can only be heated to 60°C.

THERMAL ARK SPECIFICATIONS

Unit Compatibility:	May be used with all available ARK trough plates
Voltage	110/220V ($\pm 10\%$) switchable
Heater wattage:	Approximately 60W
Controller type:	Single readout (heater plate only)
Temperature range:	Ambient to 100°C
Accuracy:	$\pm 0.1^\circ\text{C}$ of set temperature

THE ARK FLOW CELL

The utility of Spectra-Tech's ARK HATR accessory can be greatly expanded with the addition of the ARK Flow Cell. The Flow Cell permits simplified filling and flushing of the cell. This unique cell has excellent flow characteristics that enable it to be used with all types of liquids including those that are viscous such as: motor oils, glycerin, edible oils, syrups and simethicone.

The ARK HATR Flow Cell features:

- Temperature and pressure capability - unique to the Spectra-Tech HATR Flow Cell
- Manual operation or automated sampling option for maximum laboratory productivity
- Largest variety of crystal materials and angles available for virtually any application
- Excellent flow characteristics make the cell easy to fill and clean
- 65 μ l cell volume requires very little sample

ELEVATED TEMPERATURE AND PRESSURE CAPABILITY

The ARK Flow Cell has the unique capability to allow samples to be analyzed at dynamic, non-ambient temperature and pressure conditions. The standard ARK Flow Cell allows samples to be flowed under pressures up to 500 psi. The cell has optional heating capability available up to 200°C.

COMPATIBILITY WITH THE ARK HATR

The standard ARK Flow Cell has a 45° zinc selenide (ZnSe) crystal which is ideal for a wide variety of liquid samples. Other crystal materials and crystal angles are available to optimize performance for different applications. The crystal has a leakproof seal even under the maximum pressurized conditions. The teflon-coated aluminum housing of the HATR Flow Cell has the same mounting configuration as Spectra-Tech's standard ARK HATR plates. This allows the ARK Flow Cell to be used with all of our ARK HATRs without any modification to the accessory.

The HATR Flow Cell comes standard with Upchurch fittings and 1/16 inch (O.D.) Teflon tubing. This is ideal for filling the cell's 65 μ l (approximate) volume. Other fittings such as Swagelok, 1/8 inch tubing and other tubing materials are available as an option.

ARK FLOW CELL SPECIFICATIONS

Cell Body:	Teflon-coated Aluminum
Cell Volume:	65 μ l (exclusive of tubing)
Crystal Type:	45° ZnSe standard (other angles and materials optional)
Temperature Range:	Ambient (Optional to 200°C)
Pressure Range:	Ambient to 500 psi
Fittings:	Upchurch with 1/16 inch (O.D.) tubing (other types available as an option)
O-Ring:	Kalrez standard

APPLICATIONS

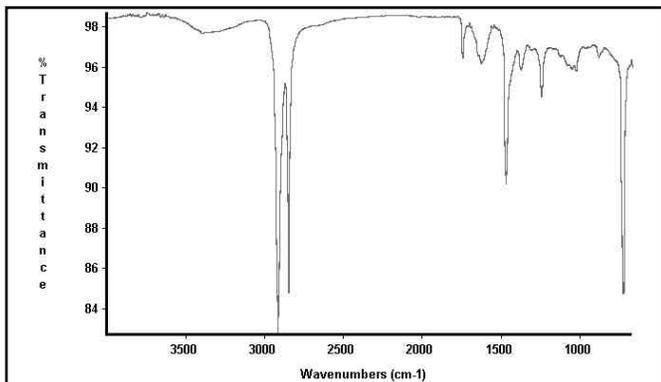


Figure 1

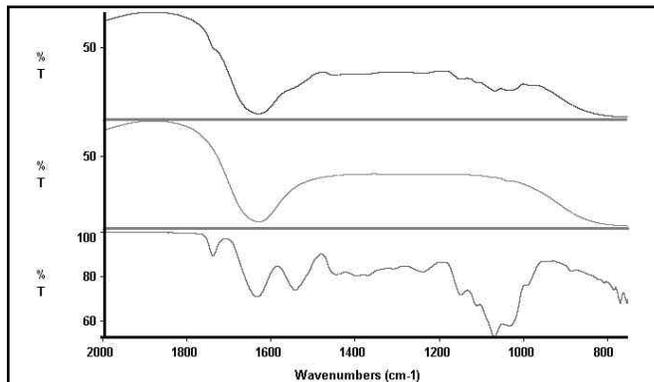


Figure 2

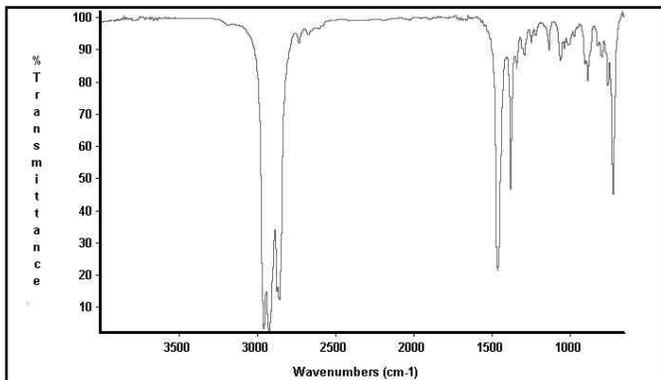


Figure 3

Figure 1: Spectrum of a polymer bag, obtained using ARK Flat Plate Kit.

Figure 2: Top spectrum: Whole milk, Middle spectrum: Water, Bottom spectrum: Water subtraction illustrating protein, fats. Obtained with the ARK Trough Plate Kit.

Figure 3: Spectrum of a volatile solvent, n-hexane, obtained with the ARK Flow Cell.

SAMPLING PLATES						
Angle	ZnSe		Ge		ZnS	
	Flat	Trough	Flat	Trough	Flat	Trough
30°	NA	NA	0055-714	0055-614	NA	NA
40°	0055-702	0055-602	0055-712	0055-612	0055-732	0055-632
45°	0055-703	0055-603	0055-713	0055-613	0055-733	0055-633
50°	0055-706	0055-606	-	-	-	0055-637
55°	0055-707	0055-607	-	-	-	-
60°	0055-705	0055-605	0055-715	0055-615	0055-735	0055-635
70°	0055-708	0055-608	-	-	-	-

For other materials or angles, please contact Spectra-Tech.

ADDITIONAL ARK FLOW CELL CRYSTALS				
PART NUMBER 0056-3##				
Angle	ZnSe	AMTIR	ZnS	Ge
30°	NA	NA	NA	14
40°	02	43	32	12
45°	03	NA	33	13
50°	06	NA	NA	NA
55°	07	NA	36	NA
60°	05	NA	35	15

ORDERING INFORMATION

PART NUMBER	PRODUCT NAME	PRODUCT DESCRIPTION
0055-3XXT	ARK Trough Plate Kit	Includes: Base Optical Unit, 45° ZnSe trough sampling plate, integral purge, purge foam, volatile liquid cover, powder press, manual.
0055-3XX	ARK Flat Plate Kit	Includes: Base Optical Unit, 45° ZnSe flat sampling plate, integral purge, purge foam, pressure device, manual.
0055-2XX	ARK Combination Kit	Includes: Base Optical Unit, 45° ZnSe flat sampling plate, 45° ZnSe trough sampling plate, integral purge, purge foam, volatile liquid cover, pressure device, powder press, manual.
0056-3##	ARK Flow Cell	Includes: HATR Flow Cell with fittings, 45° ZnSe crystal, Teflon tubing and manual.
0056-3##H	Heated ARK Flow Cell	Includes: HATR Flow Cell with fittings, 45° ZnSe crystal, Teflon tubing, heating cartridges, RTD, safety cage, insulating disks, temperature controller and manual.
0056-0XX**	Thermal ARK Package	Includes: Complete ARK and Thermal ARK, 45° ZnSe trough sampling plate (with safety handles), precision temperature controller.
0056-100	Thermal ARK Upgrade Package	Includes: Heating Plate with RTD and safety devices, insulator plate and precision temperature controller.

"XX" denotes instrument code
"##" denotes crystal codes

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Representative Offices in Europe, Asia and Latin America

For the name of the representative in your local area, please contact Spectra-Tech.

A subsidiary of Thermo Optek Corporation,
a Thermo Electron Company

website: www.spectra-tech.com
e-mail: masterwebber@spectra-tech.com

In USA
Spectra-Tech Inc.
2 Research Drive
P.O. Box 869
Shelton, CT 06484-0869
Tel: 203-926-8998
Toll-free 800-243-9186
FAX: 203-926-8909

In Japan
ST Japan
1-14-10 Kakigara-cho
Nihonbashi, Chuo-ku
Tokyo, 103 Japan
Tel: (033) (666) 2561
FAX: (033) (666) 2658