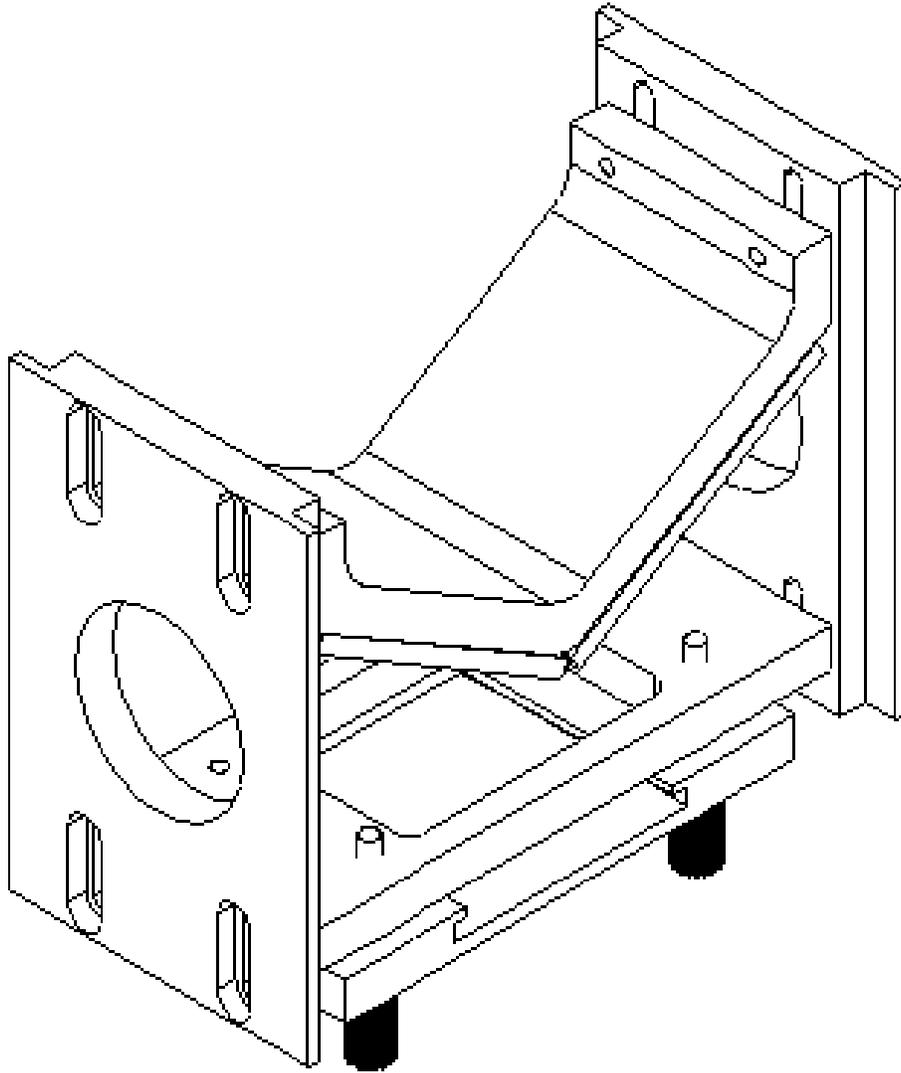


DPT™ Sampler Installation and User Guide



Madison Instruments, Inc
Spectroscopy Group

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Please address your comments regarding this user guide to:

Technical Publications
Madison Instruments, Inc.
225 W Beltline Hwy
Madison WI 53713-2602
U.S.A.

Phone: (608) 270-3800
Toll Free: (888) 349-3847
Fax: (608) 270-3801
E-mail info@madisonir.com
Web Site www.madisonir.com

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Introduction

The DPT™ Sampler is Madison Instruments, Inc. Dual Pass Transmission Sampler. Use this accessory positioned in the 2 x 3 inch sample holder found in most popular FTIRs. This is the same sample holder used to mount transmission cells and pellet holders in the spectrometer. The sample is introduced on the DPT™ Sample Card that consists of a patented Low-E Microscope Slide mounted in a safe paper slide holder. For many samples this is the quickest and least expensive sampling method available.

About the DPT™ Sampling Technique

Use the low cost and disposable DPT™ Sample Cards as a substrate for your sample when running reflection-absorption experiments. For a typical reflection-absorption experiment, the sample is deposited on the reflective surface of the DPT™ Sample Card. Using a specular reflectance accessory to analyze the sample, the beam passes through the sample, reflects off the surface of the card, and passes through the sample layer a second time before exiting. (Thus the acronym DPT™, Dual Pass Transmission.)

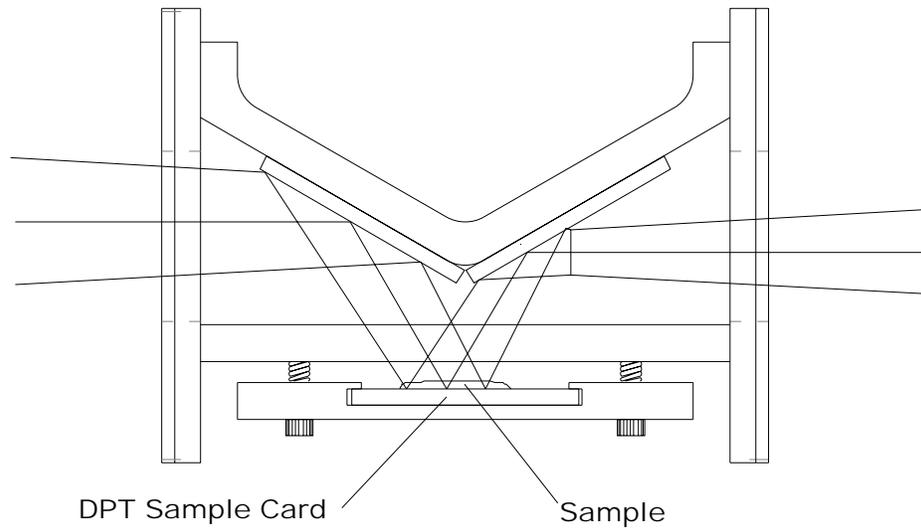
When collecting data in this manner, the resulting spectrum generally resembles a transmission spectrum. Slight differences between the transmission spectrum and the spectrum obtained using the DPT™ accessory may be observed if the sample exhibits significant specular reflectance. Specular reflectance is the mirror-like reflection obtained from the surface of a sample. The specular reflection from most organic liquids, gels and pastes is quite weak - less than 4% for the spectral range where the material is non-absorbing. However in regions of strong absorption the effect is often enhanced.

Infrared spectra containing a significant level of specular reflectance often exhibit derivative-like absorption. When a specular reflectance spectrum is mixed with the dual pass transmission spectrum, absorbance peaks may appear to be slightly shifted from their corresponding position in the pure transmission spectrum. The distortions present in a pure specular reflectance spectrum can be easily corrected using the Kramers-Kronig transform found in many commercial FTIR software packages. The spectrum obtained using the DPT™ accessory is a mixture of transmission and specular reflectance. Use of the Kramers-Kronig transform on DPT™ spectra is not recommended.

Samples will have varied amounts of contribution from the specular component. Many samples will look identical to pure transmission spectra while others may have peak shifts and splitting of individual absorbance bands. The DPT™ system can be successfully used for identification of raw materials in spite of the slight differences described above if the reference standard spectrum is also acquired using the DPT™ system. Any differences between a DPT™ spectrum and the transmission spectrum are highly reproducible between like samples. Comparison of a candidate raw material to a standard acquired under identical sampling conditions can be expected to yield comparable results.

The Infrared Light Path

After being redirected by the first flat mirror, the infrared light passes through the sample. It then reflects off the patented Low-E glass slide found in the DPT™ Sample Card. The light then passes through the sample a second time. After reflecting off of the last flat mirror the infrared light continues on to the infrared detector.

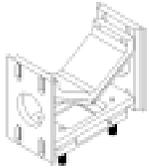


Unpacking Your Accessory

What's Included

In your package, you should find:

1. The DPT™ Sampler
2. Slide starter kit: a box containing 10 DPT™ Sample Cards.
3. Adjustment tool
4. This manual

			
DPT™ Sampler	DPT™ Sample Cards	Adjustment Tool	Installation and User Guide

What to do if parts are missing

Contact us immediately if any parts are missing. We will remedy the situation without delay. Our [contact information](#) can be found on the first page of this manual.

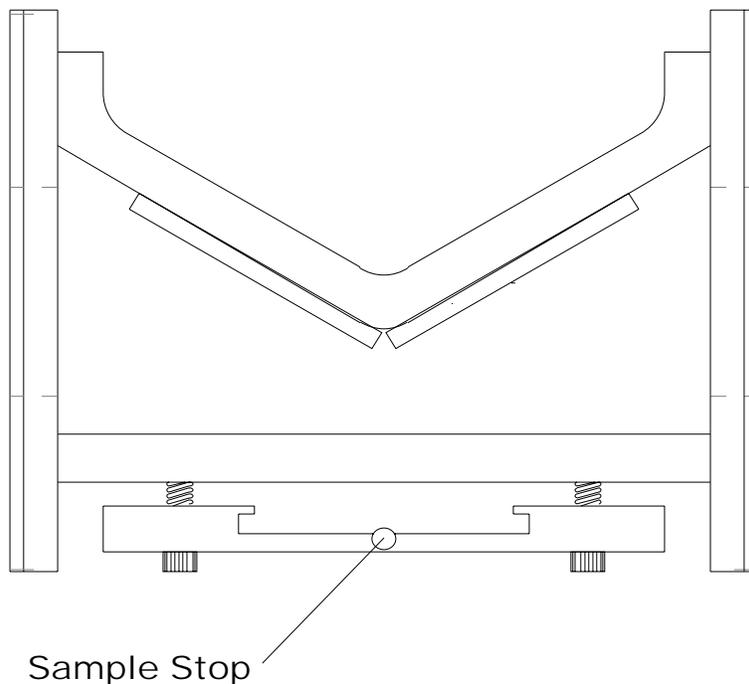
What to do if you find damage

If any part of your DPT™ Sampler Kit has been damaged in shipment, please save and document any damaged packaging so that a claim can be filed with the shipping company. Then contact us to let us remedy the situation without delay. Our contact information can be found on the first page of this manual.

Installation

Setup

Install the 2 x 3 sample holder provided by your instrument vendor. Referring to the diagram below, note which side of the accessory has the sample stop. Start the software program that indicates the interferogram amplitude. After verifying that the instrument is getting the usual signal strength, slide the DPT™ accessory into the 2 x 3 inch sample holder with the mirrors facing down and the sample stop away from you.



For the first alignment step, **do not** have a DPT™ Sample Card in the sample position. Move the top bracket (see diagram on page 10) to the highest point possible where you do not get a signal. At some point, the top bracket will be high enough to allow a portion of the infrared beam to pass directly through the accessory without hitting any mirrors. You want to position the top bracket just below that point. “No signal “ is the same reading you expect with a completely blocked beam. There will still be residual system noise.

Next, insert a new DPT™ Sample Card into the sample position. While continuing to run the spectrometer’s align program, maximize the signal strength using the three adjustment screws on the sample holder. If the adjustment screws are at their extremes of adjustment range, move the bottom bracket to center the adjustment screws.

If your instrument has more than one position available for the 2 x 3 sample holder, you may want to try various positions to determine which delivers the highest throughput.

While still running the align program, remove the DPT™ Sample Card. Again verify that the signal is gone. If it is more than background noise, repeat the alignment procedure, paying close attention to the first step.

Sampling Procedure

Background

Set the instrument software with the desired collection parameters.

Insert a new DPT™ Sample Card into the accessory, verifying that the glass is facing up and is fully inserted.

Initiate the collection of the background spectrum.

Sample

Prepare the sample.

Apply the sample to the glass surface in the DPT™ Sample Card. For liquids try wiping the slide with the sample using a cotton swab or lint free cloth.

Insert the card into the accessory, verifying that the sample is facing up and is fully inserted.

Collect the sample spectrum.

Initiate the collection of the sample spectrum.

If the absorbance is too high, reduce sample thickness by wiping with lint free cloth or other sample thinning techniques.

Precautions

Reusing DPT™ Sample Cards

Some customers have reported the ability to reuse DPT™ Sample Cards. Although this is possible for some situations, because of the possibility of sample contamination, it is not recommended.

Mirrors

The mirrors are first surface uncoated aluminum on a glass substrate. This provides the maximum transmission in the infrared region. This coating is quite delicate so great care should be taken to avoid touching the surface of the mirrors. Normal cleaning techniques should not be used. We recommend blowing off any dust or debris with clean, dry, compressed air, only. Please wear safety glasses when using compressed air.

Safety

CAUTION, The glass mirrors of the DPT Sampler may have sharp edges. The glass found inside the DPT™ Sample Cards also has sharp edges.

Disposal of Used DPT™ Sample Cards

Please handle and dispose of the DPT™ Sample Cards in the same manner as appropriate for the sample applied to the card.

Maintenance

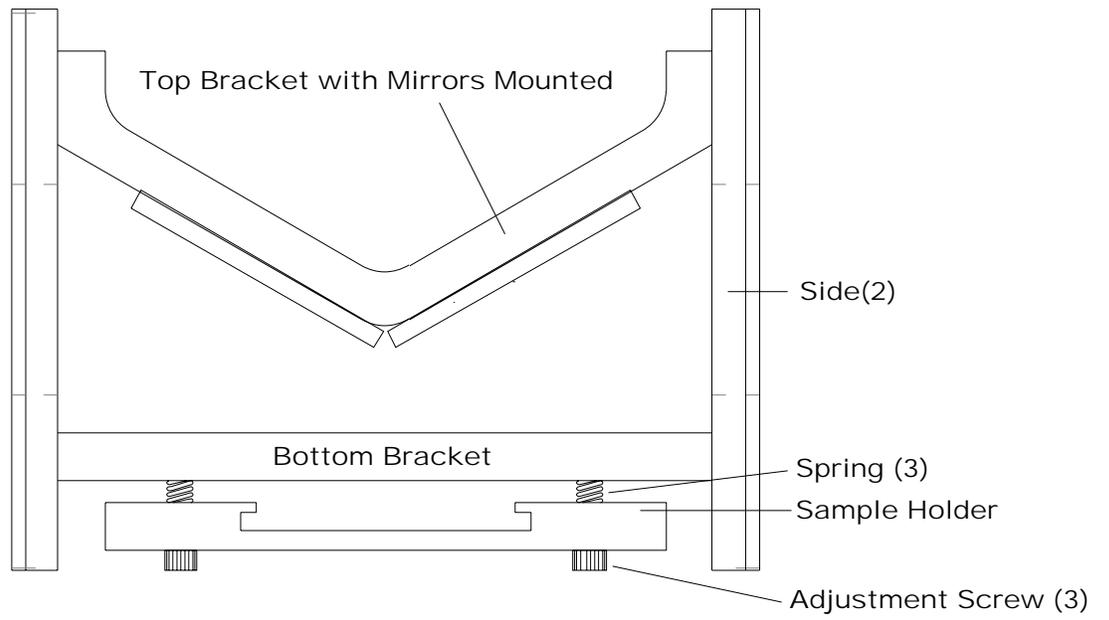
Keep the accessory as dust and debris free as possible. We recommend blowing off any dust or debris with clean, dry, compressed air, only. Please wear safety glasses when using compressed air.

If realignment becomes necessary, follow directions found in the [Installation/Setup](#) section of this manual.

Continuous Improvement

Because of our commitment to continuous improvement, we welcome, and in fact, encourage, your feedback. If we incorporate your idea for improving this product, we will provide you with an updated version, at no cost.

Part Identification



Order Forms

Spare Parts

Qty	Description	Part No.	Unit Price	Extended
	Top Bracket w/Mirrors Mounted	0010-0001	\$175.00	
	Bottom Bracket	0010-0002	\$55.00	
	Side	0010-0003	\$75.00	
	Sample Holder	0010-0004	\$75.00	
	Spring	0010-0005	\$3.00	
	Adjustment Screw	0010-0006	\$.50	
	Installation and User Guide	1012-0001	\$7.50	
	Adjustment Tool	0010-0007	\$5.00	
	DPT™ Sampler Kit Includes: DPT™ Sampler, Installation and User Guide, Adjustment Tool, and 10 DPT™ Sample Cards	0412-0007- 01	\$395.00	
	SHIPPING/HANDLING Standard (USP Priority Mail usually same day)		\$6.95	
	SHIPPING/HANDLING Overnight		\$24.95	
	SUBTOTAL			
	Enter your total sales tax rate State+County+Local> %		x Subtotal=	
	TOTAL			

Consumables Supplies

Qty	Description		Unit Price	Extended
	Box of 25 DPT™ Sample Cards Shipping and Handling Included (USP Priority Mail)	0412-0010- 01	\$37.95	
	Shipping/Handling Upgrade to Overnight Service		\$19.95	
	Subtotal			
	Enter your total sales tax rate State+County+Local> %		x Subtotal=	
	TOTAL			

Your Name		PO# or	
Company		Credit Card#	
Spectrometer Mfg		Type	
Spectrometer Model		Expiration Date	
Shipping Address		Billing Address	
Signature		Date	

Discount Coupon

Redeem this coupon for a 10% discount on your first order.

SIMPLY COMPLETE THIS FORM AND RETURN IT WITH YOUR ORDER FOR **10% OFF** YOUR FIRST PURCHASE OF SPARE PARTS OR CONSUMABLE SUPPLIES FOR YOUR DPT™ SAMPLER. Only one coupon per DPT™ .

DPT™ Serial Number:

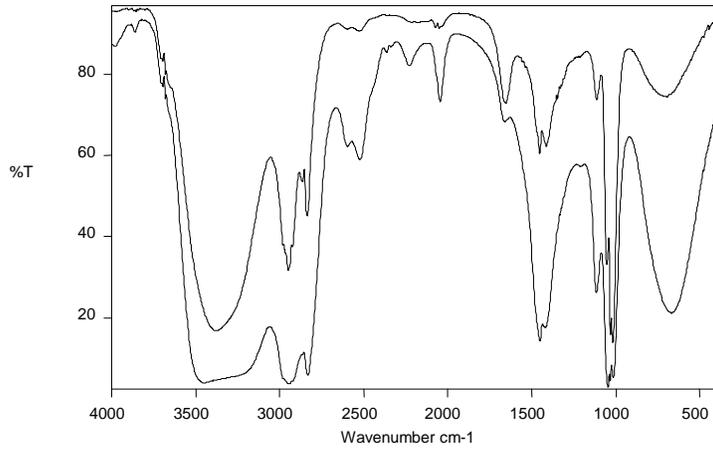
Company Name:

Address:

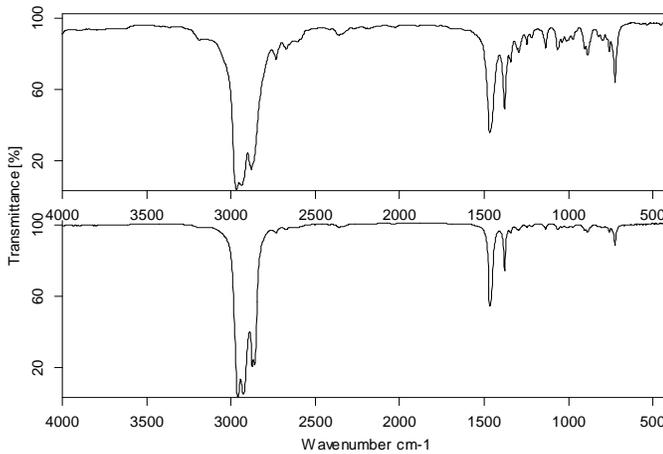
Contact Name:

Telephone Number:

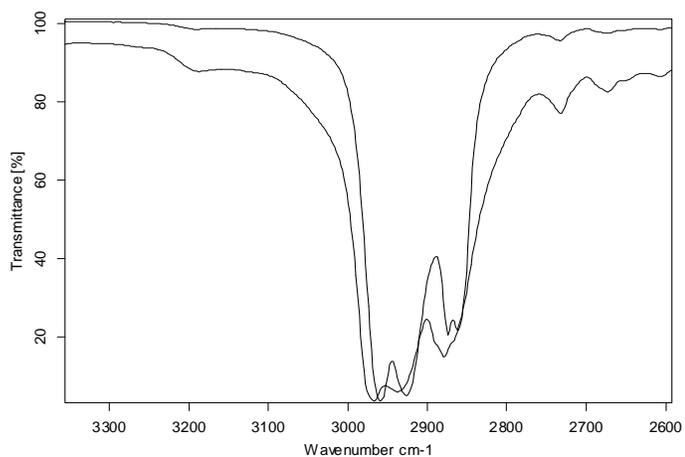
Appendix A – Example Spectra



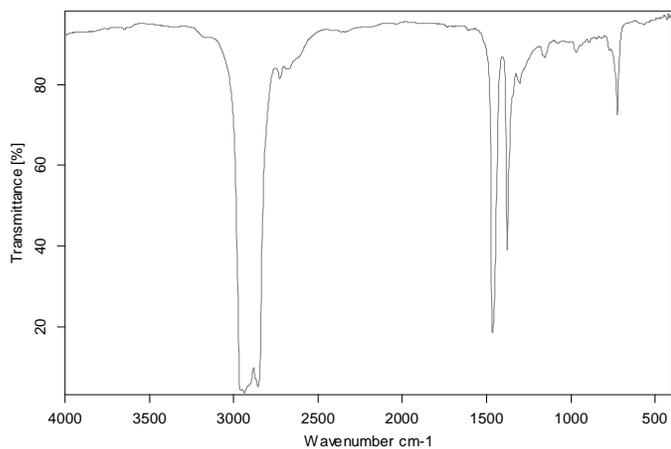
Methanol with different sample thickness



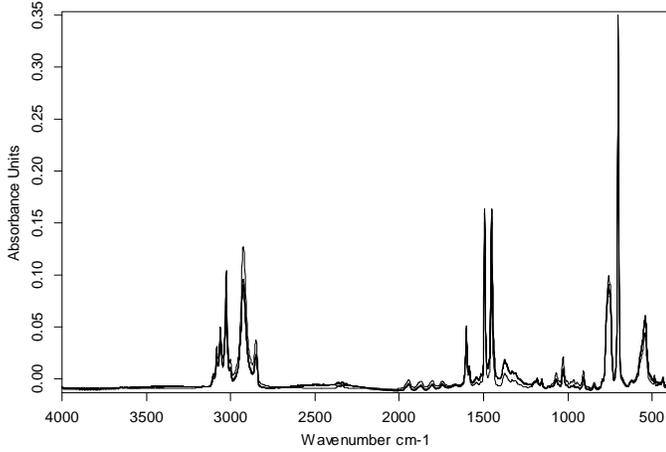
Mixture of hexanes (85% n-hexane)
Top: using the DPT sampler
Bottom: transmission through capillary film



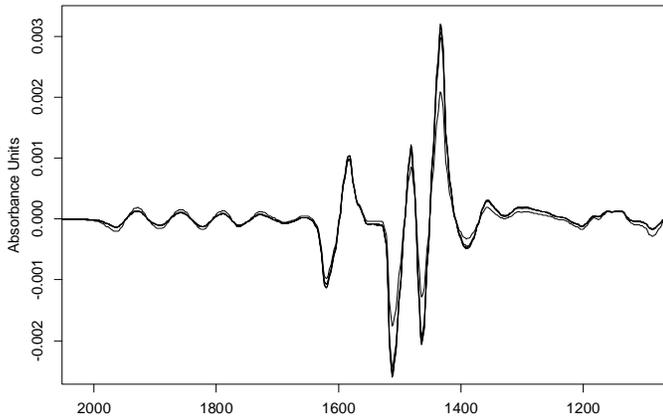
C-H stretching region showing effect of specular reflection from sample surface



Lubricating oil measured at 4 cm^{-1} resolution, 5 second measurement.
Spectrometer: Bruker Vector 22



Polystyrene film cast from xylene: 5 replicate sample measurements
4 cm⁻¹ resolution, 5 second measurement on DPT Sampler



1st derivative of 5 polystyrene film spectra showing excellent wavelength precision.