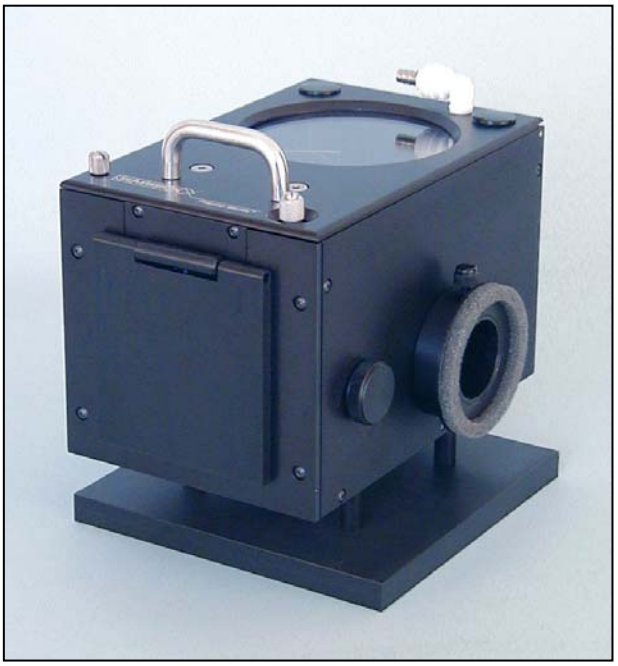
THE PRAYING MANTIS

The Praying Mantis was the first generally available diffuse reflection attachment and remains the forerunner in the field. It incorporates two 6:1, 90° off-axis ellipsoids which form a highly efficient diffuse reflection illumination and collection system. This unique configuration deflects the specular reflectance away from the collecting ellipsoid, minimizing the associated spectral distortions. It also can be configured to study materials and reactions in controlled environments with the appropriate reaction chamber.

APPLICATIONS

- For easy and reliable diffuse reflection analysis of solids and powders.
- Analysis of catalysts and other powders in a temperature and/or pressure controlled environment.



FEATURES

- Highly efficient collection system.
- Minimizes the detection of the specular component.
- Ellipsoids pivot to provide easy access to the sampling area.
- Allows easy attachment of reaction chambers.
- Several models offered for compatibility with a wide range of IR-UV-VIS spectrometers.
- Harrick's exclusive PermaPurge™ allows rapid exchange with minimal interruption of the system purge.

INCLUDES

- Cart with two mounted alignment mirrors.
- Alignment post.
- Sample cart.
- Two sampling cups: 10mm adjustable height and 3mm adjustable microsampling.
- Funnel.
- Mating hardware for the specified spectrometer.

ORDERING INFORMATION

	CATALOG NO.
Praying Mantis Diffuse Reflectance Accessory	DRP-XXX
Praying Mantis Kit, 110V (includes HVC Chamber, Temperature Controller and sampling tools)	DRK-1-XXX
Praying Mantis Kit, 220V (includes HVC Chamber, Temperature Controller and sampling tools)	DRK-2-XXX

OPTIONS & REPLACEMENT PARTS

Alignment Fixture	DRP-ALN	
Sampling Accessory Kit	DRP-SAP	
Micro-sampling Cup	DRP-SX3	
Sampling Cup	DRP-S10	
	FT-IR	*UV-VIS*
Ambient Sample Chamber	DRP-ASC	DRP-ASC-VUV
High Temperature, Low Pressure Reaction Chamber , 110 V	HVC-DRP-1	HVC-VUV-1
High Temperature, Low Pressure Reaction Chamber, 220/240 V	HVC-DRP-2	HVC-VUV-2
High Pressure Dome for the HVC Reaction Chambers (Max. Pressure: 500 psi)	HVC-DWI-3 (ZnS)	HVC-DWA-3 (SiO_2)
Low Temperature, Low Pressure Reaction Chamber , 110 V	CHC-CHA-1	CHC-VUV-1
Low Temperature, Low Pressure Reaction Chamber, 220/240 V	CHC-CHA-2	CHC-VUV-1

Harrick Scientific Corporation
88 Broadway, PO Box 1288, Ossining, NY 10562
Ph: 800-248-3847, FAX: 914-762-0914, web site: www.harricksci.com, e-mail: harricksci@aol.com

The Praying Mantis™ was the first generally available diffuse reflection accessory (DRA) and remains the forerunner in the field today. It is ideal for reliable diffuse reflectance studies of powders and other rough surface solid samples.

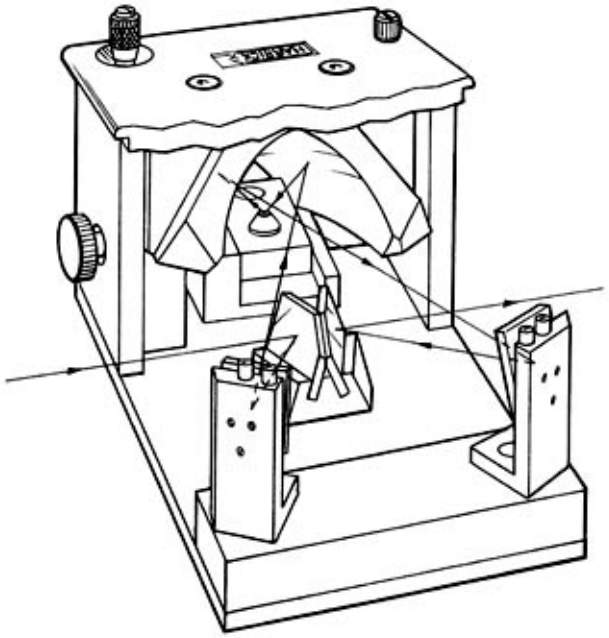


Figure 1. Interior View of the DRP.

The typical optical configuration of the Praying Mantis™ Diffuse Reflectance Attachments is shown in Fig. 1. The DRA incorporates two 6:1 90° off-axis ellipsoidal mirrors. One ellipsoid focuses the incident beam on the sample while the second collects the diffusely reflected radiation from the sample. Both ellipsoidal mirrors are tilted forward so the diffusely reflected radiation is collected at an azimuthal angle of 120°. This deflects the specularly reflected component behind the collection ellipsoid, minimizing the intensity of restrahlen bands caused by the specularly reflected light. Most other commercially available attachments collect the diffusely reflected light at 180°, where the restrahlen bands have maximum intensity**.** This optical geometry permits collection of up to 20% of all the diffusely reflected radiation, making the DRA quite practical for routine measurements.

The Praying Mantis™ can be used to examine powders and small solid samples. The sample is placed in one of the supplied sampling cups on the Praying Mantis™ sampling stage. The height of the stage can then be adjusted for optimal performance. The micrometer-style height adjust allows for accurate and reproducible positioning of the sample. For easy access to the sampling area, the Praying Mantis™ features the ability to flip its illumination and collection ellipsoids away from optical plane of the attachment.

The Praying Mantis™ also features PermaPurge™ and hence is enclosed in a purgeable box for rapid sample exchange with minimal interruption of the purge. This eliminates interference from water and carbon-dioxide bands in the infrared.

The Praying Mantis™ is ideal for studying samples in a controlled environment and several optional chambers are offered. Our Ambient Sample Chamber is designed for analysis of air-sensitive samples. The samples can be loaded in a glove box or similar enclosed environment. The chamber can then be sealed, removed from the glove box, and inserted in the Praying Mantis™ for analysis. This chamber features a removable stainless steel dome with two KBr or UV quartz windows and a glass observation window.

Two reaction chambers (see separate data sheet) are also available. These reaction chambers are designed for operation in static or flow conditions. Our Low Temperature Chamber is designed for operation up to 1-2 ATM and for temperatures ranging from -150ºC to 600ºC. Our High Temperature, Low Pressure Chamber operates at temperature up to 600ºC (under vacuum) and from pressures of 10^{-6} torr to 2 ATM. With its optional High Pressure Dome, this chamber can withstand pressures up to 500 psi.. This chamber can be purchased as part of a kit including the Praying Mantis™, Automatic Temperature Controller and comprehensive sampling tools (mortar and pestle, KBr powder, finger cots and spatula).

Representative spectra recorded with the Praying Mantis are shown here in Figures 2 and 3. Note that Figure 3 was recorded using the DRA with its HVC reaction chamber.

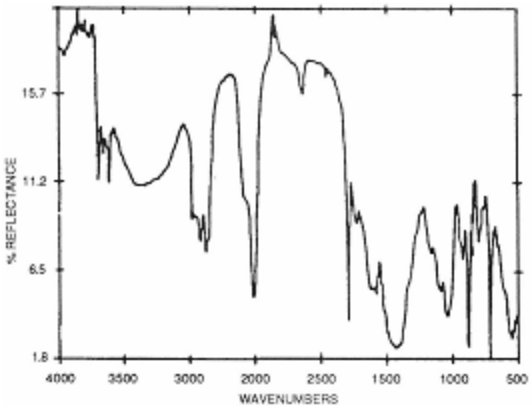


Figure 2. Diffuse Reflection of Chalk.

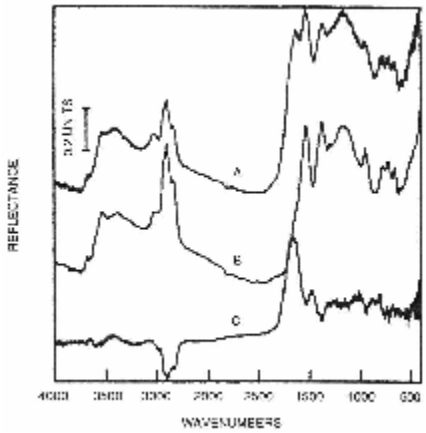


Figure 3. Diffuse Reflection of Wyodak Coal (A) after 24 hrs of oxidation at 2.4KPa at 393°C, (B) dried unoxidized samples, and (C) the difference spectrum (A-B).