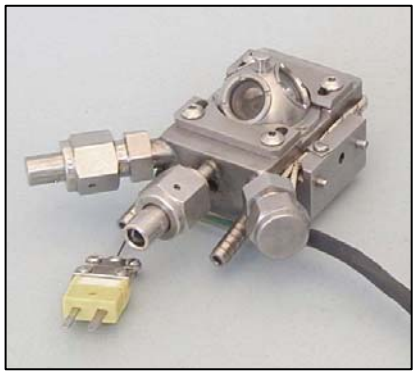
HIGH TEMPERATURE REACTION CHAMBER FOR THE PRAYING MANTIS

Diffuse reflection spectroscopy is a very sensitive method for detecting changes at the surfaces of rough materials. It is particularly effective for powders that have high surface areas. This makes diffuse reflectance a valuable tool for studying heterogeneous catalysis, gas-solid interactions, photochemical reactions, and oxidation mechanisms. This High Temperature Reaction Chamber is well suited for performing such studies under carefully controlled temperatures and pressures.

APPLICATIONS



- Allows diffuse reflection measurements under controlled temperatures and pressures.
- Used in conjunction with the Praying Mantis Diffuse Reflection Accessory.

FEATURES

- Designed for operation from high vacuum (133 μPa or 10^{-6} torr) to 133 kPa (1 ktorr) and at temperatures up to 910°C (under vacuum).
- Three inlet/outlet ports provided for evacuating the cell and introducing gases.
- Made of chemically resistant 316 stainless steel.
- Readily adapted for operation up to 3.44MPa (25.8 ktorr) with an optional high-pressure dome.
- Optional Silcotek/Restek coatings available for superior inertness and corrosion resistance.
- Alternative window assemblies available for microspectroscopy applications, including Raman.
- Optional cooling cartridge available for moderate cooling or heating with a chiller or recirculator.

WINDOWS FOR THE REACTION CHAMBER DOMES

Material	Standard Dome (2mm thick)	High Pressure Dome (4mm thick)
SiO_2	WAD-U23	WAD-U43
Si	WED-U23	--
CaF_2	WFD-U23	--
ZnS	WID-U23	WID-U43
ZnSe	WMD-U23	WMD-U43
KBr	WPD-U23	--

INCLUDES

- Reaction Chamber.
- Low-voltage heating cartridge.
- K-type thermocouple.
- Sample packing tool and spill tray.
- Dome with one glass observation window and two KBr windows for the infrared or two SiO_2 windows for the UV-Vis-NIR.

ORDERING INFORMATION

	CATALOG NO
High Temperature Reaction Chamber, 24V (FTIR)	HVC-DRP-4
High Temperature Reaction Chamber, 24V (UV-Vis-NIR)	HVC-VUV-4

OPTIONS & REPLACEMENT PARTS

Screen Set, two each of three mesh sizes	116-439	High Pressure Dome, ZnS Windows	HVC-DWI-3
K-Type Thermocouple	008-144	High Pressure Dome, ZnSe Windows	HVC-DWM-3
Viton O-Ring Set	HVC-ORV	High Pressure Dome, SiO_2 Windows	HVC-DWA-3
Kalrez O-Ring Set	HVC-ORK	Heater Assembly	HVC-HT4
Window Assembly for Microscopy	HVC-MRA	Heater, 24V	HTRS-26
Cooling Cartridge	HVC-COL	Temp. Controller, USB to RS-485 Adapter	ATC-USB-485
110V		*220/240V*	
Temperature Controller, 24V output	ATC-024-3		ATC-024-4 (CE marked)
Vacuum Pump	VPE-001		VPE-002

Harrick Scientific Products, Inc.
141 Tompkins Ave, 2nd Floor, Pleasantville NY 10570
Ph: 800-248-3847 or 914-747-7202, FAX: 914-747-7209, web site: www.harrickscI.com, e-mail: info@harrickscI.com

Harrick Scientific offers a High Temperature Reaction Chamber for use with the Praying Mantis Diffuse Reflection Accessory for studying powders and other rough surfaced materials in a controlled environment at elevated temperatures and various pressures.

This reaction chamber is constructed of chemically resistant 316 stainless steel and features a sample cup that is part of a temperature-controlled sample stage. This stage incorporates a cartridge heater and K-type thermocouple. The stage is thermally isolated from the outer chamber. A water-cooling jacket is provided to control the temperature of the outer chamber and windows during high temperature operation. The reaction chamber also features three gas ports for evacuating, pressurizing, or flowing gas through the sample. These ports have 1/4" VCO fittings with Viton o-rings. One of these ports leads directly under the sample cup; the other two lead into the sides of the chamber.

Optically, this reaction chamber is designed to minimize reflection losses from the windows and maximize light interaction with the sample. The radiation enters and exits the chamber perpendicular to the two optical apertures. A third aperture is provided for viewing, illuminating, or irradiating the sample. This makes the reaction chamber useful for photochemical studies. The High Temperature Reaction Chamber includes two KBr windows and a glass observation window for the FTIR, or two SiO_2 windows and a glass observation window for the UV-Vis-NIR. These windows are mounted in a removable stainless steel dome using o-ring seals. This reaction chamber can be operated from high vacuum to two or three atmospheres with the KBr or SiO_2 and glass windows provided. Other window materials are available for different wavelength regions. Low refractive index window materials should be selected to minimize reflection losses.

The High Temperature Reaction Chamber is designed for operation from room temperature up to 910°C under vacuum. It can be adapted for use at higher pressures by simply replacing the dome assembly. The optional high-pressure dome assembly utilizes two optical windows and a UV quartz observation window mounted in a stainless steel dome; windows for the high-pressure dome are 4mm thick. ZnS, ZnSe and UV quartz are offered for operation to 3.44 MPa (25.8 ktorr). At higher pressures, the maximum attainable temperature might be lower, due to heat losses that depend upon thermal charactericstics of the sample, reactant gas, and gas pressure.. For optimal temperature control, Harrick Scientific recommends our Temperature Controller for stable heating of the system. Heater and thermocouple connectors are compatible with this controller.

To evacuate this chamber, use our highly reliable, compact, low-noise level Vacuum Pump with a minimum pumping speed of 1.4m^3/hr. Compliant with international standards, it is ideally suited both for use with Harrick equipment and for general use in chemistry and research laboratories. Hermetically sealed by oil pressure controlled valves, the vacuum chamber is protected against inadvertent venting and oil backstreaming. This vacuum pump is supplied with a three foot length of ½" ID vacuum tubing and with the hardware to connect this tubing to the pump. The hardware to connect this tubing to the reaction chamber is included with the vacuum pump.

Figure 1 shows several spectra recorded with the High Temperature Reaction Chamber in the Praying Mantis Diffuse Reflection Attachment. Harrick's Temperature Controller was used to regulate the temperature.

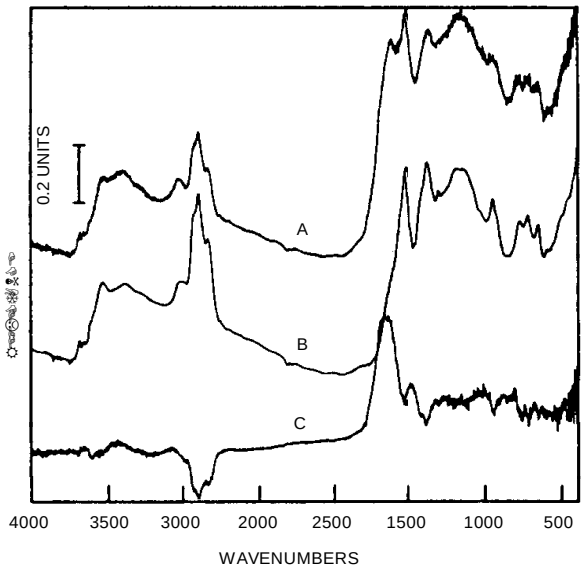


Figure 1. Diffuse Reflection of Wyodak Coal a) after 24 hrs. of oxidation at 2.4KPa at 393°C, b) dried unoxidized samples, and c) the difference spectrum (a-b).