



Surface Measurement Systems
World Leader in Sorption Science

MPA Horizon

Self-contained cross-flow analyzer for membranes & films

The MPA Horizon, a pioneer in cross-flow analysis, measures competitive gas/vapor permeation through barrier films and porous membranes. This versatile instrument adapts to single or multi-component permeate streams, delivering in real-world conditions. Bridging the gap between lab-scale and industrial processes, the MPA Horizon is a self-contained membrane analyzer with multiple sensors, ideal for mass spectrometer coupling. With the MPA Horizon, elevate your materials analysis with precision and efficiency.



- Five mass flow controllers with tuneable gas calibrations
- Up to two heated reservoirs for water/solvents
- Generation of water vapor from 0-90 %RH
- Temperature-controlled environment for samples, vapor, and gas sources
- Range of sample thicknesses (μm - mm)
- Vapor/gas sensors located before & after the sample holder:
 - CO_2
 - Water vapor
 - PID sensor - organic species: 1 ppb to 10,000 ppm
- Local heating of the membrane up to 150°C
- Use of N_2 or He as cross-flow gases

Permeation through thin-films and membranes

- Easy to measure permeability for gases and vapor in single or multicomponent systems
- Kinetics of permeation and diffusion across membranes or packing films
- Assessment of temperature effects on permeation up to 150°C , including *In-situ* drying / activation of the sample to gauge optimal activation temperature

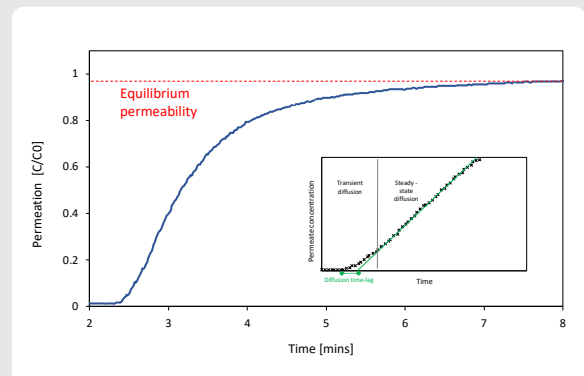


Figure 1: Permeation of 95 %RH through PET at 130°C , highlighting how the concentration front permeates through a membrane as a function of time

Comparing barrier films/protective layers

- Compare permeation through single and multi-layer films.
- Observe the effects of barrier surface modification on permeation.
- Accurately measures permeation through barrier films over a wide range of temperatures.

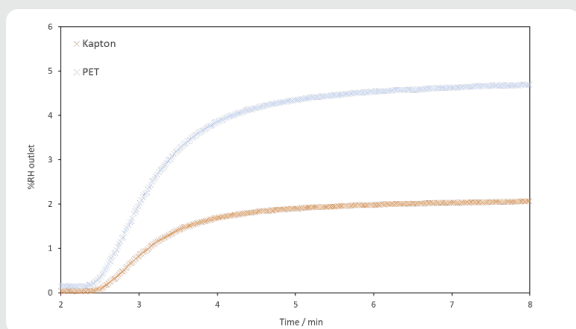


Figure 2: A comparison of the barrier properties of PET and Kapton against 95 %RH at 130 °C

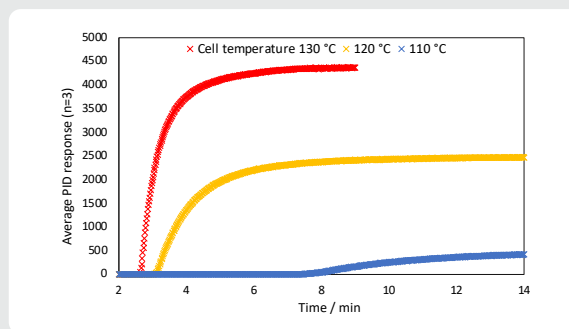


Figure 3: Increasing toluene permeation through PET from 110 - 130 °C

Case study: Impact of water vapor on CO₂ permeation through PIM-1

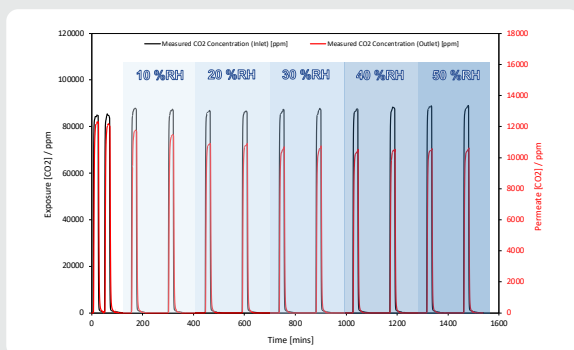


Figure 4: Permeation of 9% CO₂ through PIM-1 at 25 °C, with increasing %RH

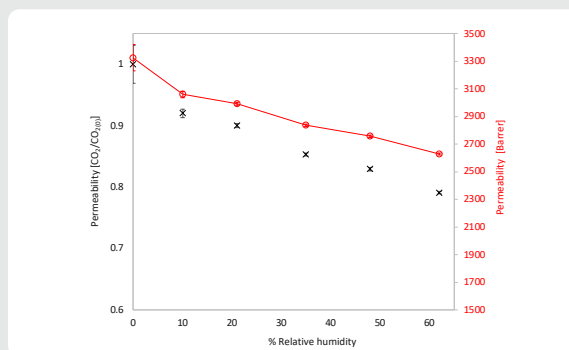


Figure 5: The influence of humidity on CO₂ permeation [Barrer] through PIM-1

- Explore the influence of humidity on the permeation of gases through membranes
- A characteristic decrease in the CO₂ permeation through PIM-1 was observed, caused by channel blockages. With a 20% decrease in CO₂ permeation through PIM-1 upon exposure to 50 %RH.
- Compare how membrane gas selectivity responds to temperature, humidity, & partial pressure changes.
- Near-perfect repeatability over three experiments, resulting in small error bars

Capabilities

- Enclosure temperature: 10 - 60 °C ±0.2 °C
- Sample heating up to 150 °C
- 50 mL heated water/solvent reservoir
- Built-in sample holder bypass
- Varying sample holder dimensions to accommodate diverse membranes/films
- Dedicated inline sensors for measurements of water, CO₂, organics (multiple range PID), & gases such as N₂ and He (TCD)
- Optional functionality with a mass spectrometer

Generation of gases & vapors:

- Mixing with resolution of 0.1 mL/min MFC
- Water 0-95% RH at ambient conditions
- ppm-level of organic solvents / VOCs*
- Dead volume calculations with helium pulses

System information:

Update system information as follows:

- Width: 520mm, Depth: 610mm, Height: 980mm
- Instrument Weight: 80kg

To inquire about the MPA Horizon, email us at: sales@surfacemeasurementsystems.com

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