# AMI-Vapor Series

## Volumetric Vapor Adsorption Analyzer

## INTRODUCTION

*"Accurate, Accessible, Advanced Gas Sorption"*

The AMI Vapor Series instruments are precision volumetric analyzers designed for advanced vapor and gas sorption characterization. These systems are ideal for analyzing adsorption isotherms, surface area, pore size distributions, and gas selectivity, using non-corrosive and safe adsorbates under controlled conditions.

Typical adsorbates include water vapor, benzene, carbon monoxide, ammonia, and other non-corrosive gases and vapors at room temperature.

### Key Functions

✓ Vapor Adsorption Isotherms: Evaluate adsorption behavior over a range of relative pressures for various vapor species.

✓ Gas Selectivity & Capacity: Determine selective adsorption characteristics and quantify sorption capacity.

✓ Surface Area & Pore Size Distribution: Low-temperature nitrogen adsorption method for BET and BJH analysis.
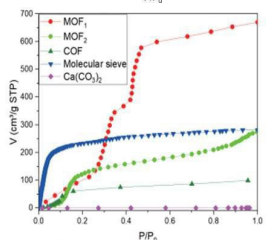


*Figure 1. **AMI-Vapor** Series*

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## FEATURES

### Automated Vapor Generation and Delivery

- **Fully Automated Vapor Source Module:** Eliminates manual handling. Ensures high-purity vapor via software-controlled delivery.
- **Vapor Source Thermostatic Control:** Integrated water bath under software control for consistent vapor temperature and stability.

### Advanced Analysis Capabilities

- High-precision pressure transducers (10, 100, 1000 torr) for accurate measurements across a wide pressure range.
- High-vacuum corrosion-resistant solenoid valves.
- Comprehensive software automation for sorption analysis and reporting.

### Precision Vacuum Control

- **Ultra-High Vacuum System:** Includes a turbo molecular pump to achieve pressures down to $10^{-7}$–$10^{-8}$ Pa, optimizing desorption and system cleanliness.
- **Cold Trap System (Dual Stage):** Standard dual cold traps minimize vapor back streaming and protect the vacuum pump, extending system longevity.

### Thermal Stability and Sample Conditioning

- **Thermostated Analysis System:** Built with corrosion-resistant materials and heated pathways to avoid condensation. Temperature range: ambient to 50°C.
- **Sample Temperature Control Options:**
  - Dewar Flask: 77 K (liquid nitrogen)
  - Water Bath (Optional): -10°C to 95°C
  - **CryoTune Cold Bath (Optional):** Adjustable ranges
    - 82–135 K
    - 120–170 K
    - 180–323 K



1 - Cold Trap
2 - Pre-Treatment Station
3 - $P_0$ Tube
4 - Analysis Port
5 - Dewar
6 - Vapor Source
7 – Heating Socket

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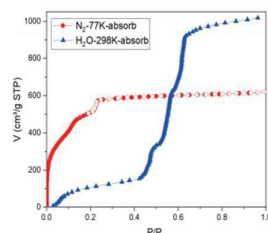
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# APPLICATIONS

The AMI Vapor Series is designed for precise characterization of porous materials such as MOFs, COFs, zeolites, and activated carbons. It supports studies in gas storage, separation, catalysis, and environmental remediation by enabling accurate measurement of vapor and gas adsorption behavior. The system is ideal for evaluating sorbent performance, selectivity, and capacity under controlled temperature and humidity conditions.
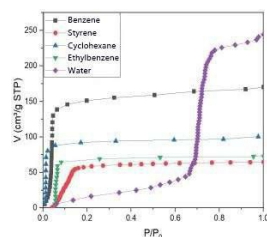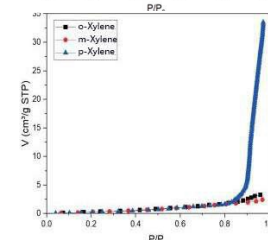


At 25°C, Adsorption Performance of MOFs for Water and Several Structurally Similar Organic Vapors.



Adsorption/Desorption Curves of MOF Material for Nitrogen at 77K and Adsorption Curve for Water Vapor at 25°C.



At 25°C, Adsorption Curves of MOFs, COFs, Molecular Sieves, and CaCO₃ for Water Vapor.



At 25°C, Adsorption Curves of MOFs for Three Isomers of Xylene (Ortho-xylene, Meta-xylene, Para-xylene).

# AMI-Vapor Series Configurations



**AMI-Vapor 100**
*Single Vapor Adsorption Station*



**AMI-Vapor 200**
*Vapor Adsorption Station + Physical Adsorption Station*

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## SPECIFICATIONS

| Vapor Series | | | |
|---|---|---|---|
| **Specific Model** | Vapor 100B | Vapor 200B | Vapor 200C |
| **Analysis Ports** | 1 Vapor Sorption Port | 1 Vapor Sorption Port ; 1 Gas Sorption Port | |
| **$P_0$ Transducer** | 1 | | |
| **Analysis Pressure Transducer** | 3 | 4 | 6 |
| **Vapor Sorption Port** | 1000 torr, 100 torr, 10 torr | 1000 torr, 100 torr, 10 torr | 1000 torr, 100 torr, 10 torr |
| **Pressure Transducer Accuracy and Resolution** | Accuracy: 0.2% RDG, Resolution: 0.003% F.S. | | |
| **Gas Sorption Port** | N/A | 1000 torr | 1000 torr, 10 torr, 1(0.1) torr |
| **Pump** | 1 mechanical pump (ultimate vacuum $10^{-1}$ Pa); 1 extra mechanical pump for degassing ports (optional) | 1 mechanical pump (ultimate vacuum 10-1 Pa) | 1 mechanical pump (ultimate vacuum $10^{-1}$ Pa) 1 Turbo molecular pump (ultimate vacuum $10^{-8}$ Pa) |
| **$P/P_0$ Range** | $10^{-6}$ - 0.998 | | $10^{-8}$ - 0.998 |
| **Specific Surface Area** | $N_2$: 0.05 m²/g to upper limit; Kr: 0.0005 m²/g to upper limit. | | |
| **Pore Size Range** | 0.35-500 nm (*Achieved with $CO_2$), test repeatability: ≤0.02 nm | 0.35-500 nm(*Achieved with $CO_2$), test repeatability: ≤0.02 nm | |
| **Pore Volume** | ≥ 0.0001 cm³/g | | |
| **Degassing Ports** | 1 in-situ; 1 ex-situ; | 2 in-situ | |
| **Adsorbates** | Gas: $N_2$, $CO_2$, Ar, Kr, $H_2$, $O_2$, CO, $CH_4$, etc. Vapor: H2O, Benzene, Olefins, etc. | | |
| **Cold Trap** | 2 | | |
| **Dimensions and Weight** | L 35.4 in (900 mm) × W 22.4 in (570 mm) × H 36.2in (920 mm), 209 lbs (95 kg) | | |
| **Power Requirements** | 110V or 200-240 VAC, 50/60 Hz, maximum power 300 W | | |

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