全自动竞争性气体吸附分析仪-ABR

表征新材料——用于气体分离和提纯应用研究

ABR是一款具有完全可编程操作的专用穿透曲线分析仪，包括对总压力、流速、组分和温度的控制。在软件和接口方面完美结合了Hiden公司自己品牌的在线质谱仪，5ppb级的检测限和200ms的响应时间保证了气体穿透时间点的准确检测。

样品床的尺寸可以根据用户需要进行更换。利用升温和气体吹扫(或抽真空)对样品进行原位干燥。反应气体混合物流过样品床，同时用集成的在线质谱仪对下游气体进行实时监测。

ABR的主要特点是研究人员能够用于表征少量的新型吸附剂，如MOFs、ZIF、COF和相关多孔材料等，满足那些没有充足的时间或者费用合成较大的样品量的情况。

主要特性：

★ 可对总压力、流速、组分和温度编程控制。
★ 优化的研究级样品床设计
★ 超低死体积，使得质谱信号响应迅速
★ 自动进行吹扫气体和实验气体的转换
★ 具备气体–蒸气和蒸气–蒸气分离配置
★ 实验压力可选配至50 bar
★ 完全集成的在线质谱和优化的采样设计

优势：

★ 独特的：结合在线质谱的高压穿透曲线分析仪
★ 全自动：用户编程进行全自动运行实验
★ 优化的样品床：经大量实践研究而得到最优化的2 cc样品床

应用领域：

★ 多路气体竞争吸附分析
★ 空气分离
★ 二氧化碳捕获和存储
★ 从流出物流中去除有毒或有害的气体
★ 回收稀有(贵族)气体
★ 天然气和沼气升级

技术规格：

★ 自动穿透反应系统
★ 反应床体积： 2cc
★ 工作压力：10bar/50bar
★ 最高工作温度：0～300℃
★ 温度精度： ±0.025 ℃
★ 流量范围：3～1000ml /min
★ 可选配超高真空泵站：真空度达10–8mbar
★ Hiden自己品牌在线质谱仪
质量数范围：1～200 amu
响应时间： 200毫秒

用户名录：上海科技大学|物质科学与技术学院
福建师范大学材料科学与工程学院

应用案例

1.对于N2或O2生产应用，突破曲线测量为不同材料提供了快速的实验室测试方法，比其它多组分分离技术更省力。

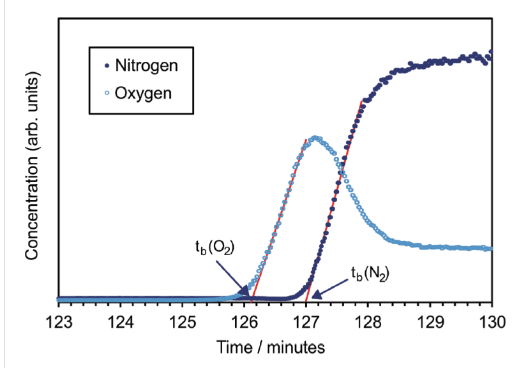


Figure 2: Breakthrough curves determined for an 80%/20% N_2/O_2 mixture at 10 bar and 25°C for 13X zeolite. The concentration is the mass spectrometer signal, in arbitrary units, for the peaks in the mass spectra at m/e = 28 (N_2) and 32 (O_2), as determined from the peak heights.

2. Xe-Kr分离应用

Metal–organic framework with optimally selective xenon adsorption and separation

Debasis Banerjee1, Cory M. Simon2, Anna M. Plonka3, Radha K. Motkuri4, Jian Liu4, Xianyin Chen5,

Berend Smit2,6, John B. Parise3,5,7, Maciej Haranczyk8,9 & Praveen K. Thallapally1

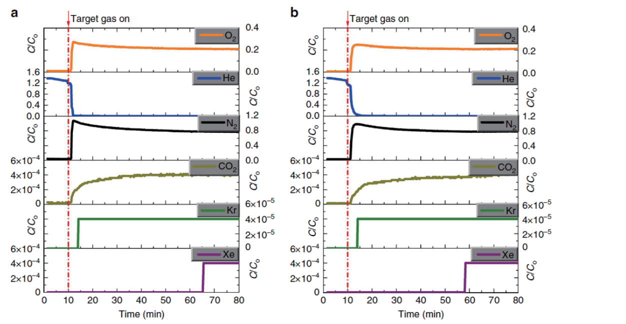


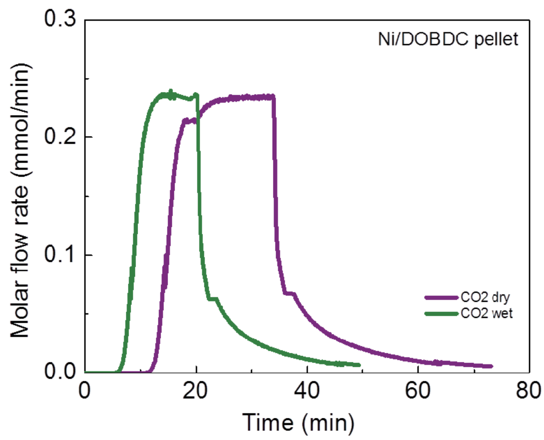
Figure 3 | Single column breakthrough experiments using SBMOF-1 at room temperature and 1 atm. Column is initially purged with He. (**a**) Inlet is a dry gas mixture with 400 p.p.m. Xe and 40 p.p.m. Kr balanced with air. (**b**) Inlet is the same gas mixture as in (**a**) with 42% relative humidity. Note that the Xe breakthrough time is only marginally decreased in the presence of water.

3. CO2捕获

Selective CO2 capture from flue gas using a metalorganic framework—a fixed bed study

Jian Liu†, Jian Tian†, Praveen K. Thallapally†,*, and B. Peter McGrail†

†Energy and Environment Directorate, Pacific Northwest National Laboratory, Richland, WA 99352, USA.



Hiden Isochema公司全新的ABR全自动穿透曲线分析仪作为大量级动态吸附反应系统，是现有IGA、IGAsorp、XEMIS和IMI系列吸附仪器的重要补充。

智能重量法吸附仪-IGA系列

水分吸附分析仪-IGAsorp

高压重量法吸附仪-XEMIS

容量法高压吸附仪-IMI系列

The **ABR** is a dedicated breakthrough analyzer, fully automated and supplied with an integrated close-coupled mass spectrometer.

The ABR is available in a range of configurations to suit research-scale samples, with bed volumes from 2 cc to 20 cc. Up to 6 gas inlets are available as well as a dedicated purge stream. Flow rates are selected to suit the specific applications, and the ABR includes an ultra-low dead volume switching valve. Options include an upgrade for operation at pressures to 50 bar, and an integrated vapor generator module for gas-vapor operation.

The ABR is designed to meet the needs of researchers wishing to characterise the gas separation performance of novel materials such as metal-organic frameworks (MOFs), zeolitic imidazolate frameworks (ZIFs) and covalent organic frameworks (COFs) without the time or expense of synthesising larger quantities of material. The breakthrough data obtained is complementary to the adsorption-desorption isotherms measured with our IGA, IGAsorp, XEMIS and IMI sorption analyzers.

Hiden Isochema ABR System: Academic References

Listed below are peer-reviewed publications featuring data measured using Hiden Isochema ABR breakthrough analyzers. All data uses Hiden Isochema ABR breakthrough analyzers with integrated Hiden DSMS dynamic sampling mass spectrometers. In all cases, data was measured by end users at their laboratory.

1. **Porous organic cages for sulfur hexafluoride separation**
   T. Hasell, M. Miklitz, A. Stephenson, M. A. Little, S. Y. Chong, R. Clowes, L. Chen, D. Tribello, K. E. Jelfs, and A. I. Cooper
   Journal of American Chemical Society (2016)
   DOI: 10.1021/jacs.5b11797
2. **Metal-organic framework with optimally selective xenon adsorption and separation**
   D. Banerjee, C. M. Simon, A. M. Plonka, R. K. Motkuri, J. Liu, X. Chen, B. Smit, J. B. Parise, M. Haranczyk and P. K. Thallapally
   Nature Communications (2016)
   DOI: 10.1038/ncomms11831
3. **Metal-organic frameworks for removal of Xe and Kr from nuclear fuel reprocessing plants**
   J. Liu, P. K. Thallapally and D. Strachan
   Langmuir, 2012, 28 (31), pp 11584–11589
   DOI: 10.1021/la301870n
4. **Selective CO2 Capture from Flue Gas Using Metal–Organic Frameworks—A Fixed Bed Study**
   J. Liu, P. K. Thallapally and B. P. McGrail
   J. Phys. Chem. C, 2012, 116 (17), pp 9575–9581
   DOI: 10.1021/jp300961j
5. **Supramolecular binding and separation of hydrocarbons within a functionalized porous metal–organic framework**
   S. Yang, A. J. Ramirez-Cuesta, R. Newby, V. Garcia-Sakai, P. Manuel, S. K. Callear, S. I. Campbell, C. C. Tang and M. Schröder
   Nature Chemistry 7, 121–129 (2015)
   DOI: 10.1038/nchem.2114
6. **Separation of rare gases and chiral molecules by selective binding in porous organic cages**
   L. Chen, P. S. Reiss, S. Y. Chong, D. Holden, K. E. Jelfs, T. Hasell, M. A. Little, A. Kewley, M. E. Briggs, A. Stephenson, K. M. Thomas, J. A. Armstrong, J. Bell, J. Busto, R. Noel, J. Liu, D. M. Strachan, P. K. Thallapally and A. I. Cooper
   Nature Materials 13, 954–960 (2014)
   DOI: 10.1038/nmat4035

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