Gas separation using novel materials: kinetics of gas adsorption on RPM-1 and Cu-BTC metal-organic frameworks  

KATHLEEN LASK, VAIVA KRUNGLEVICIUTE, ALDO MIGONE, Department of Physics, Southern Illinois University Carbondale, J.-Y. LEE, JING LI, Department of Chemistry and Chemical Biology, Rutgers University — We have measured the adsorption kinetics of two gases, freon and argon, on two microporous metal-organic framework materials, RPM-1 (or \([\text{Co}_3(\text{bpdc})_3\text{bpy}]\cdot4\text{DMF}\cdot\text{H}_2\text{O}\), \text{bpdc} = \text{biphenyldicarboxylate}) and Cu-BTC (or \([\text{Cu}_3(\text{btc})_2(\text{H}_2\text{O})_3]\), \text{btc} = \text{benzenetricarboxylate}). The measurements were conducted at comparable values of the scaled temperatures \((T_{\text{isotherm}}/T_{\text{critical}})\) for the respective gases. In our experiments, we monitor the pressure decrease as a function of time after a dose of gas is admitted into the experimental cell. The kinetics results obtained for both gases are similar on Cu-BTC, while they are significantly different in RPM-1. Our results indicate that RPM-1 has potential for gas separation for mixtures of species with dimensions similar to argon and freon; this is not the case for Cu-BTC MOF.

Vaiva Krungleviciute

Date submitted: 20 Nov 2006  
Electronic form version 1.4