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 [Co3(bpdc)3bpy]·4DMF·H2O, bpdc = biphenyldicarboxylate) and Cu-BTC (or [Cu3(btc)2(H2O)3], btc = benzenetricarboxylate). The measurements were conducted at comparable values of the scaled temperatures (T_{isotherm}/T_{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.