Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Kinetic and steric differences in adsorption in two porous metal-organic frameworks KATHLEEN LASK, VAIVA KRUNGLEVICIUTE, MURAT BULUT, ALDO MIGONE, Southern Illinois University, J.-Y. LEE, JING LI, Rutgers University — Kinetic and steric differences are two of the three fundamental mechanisms underlying the use of adsorption in applications to gas mixture separations. We present experimental results on kinetics and equilibrium adsorption measurements of tetrafluoromethane and argon on two metal-organic framework (MOF) materials: RPM1-Co or $[Co_3(bpdc)_3bpy]\cdot 4DMF\cdot H_2O]$ (bpdc = biphenyldicarboxylate, bpy = 4,4′-bipyridine, DMF = N,N- dimethylformamide) and Cu-BTC or $Cu_3(BTC)_2(H_2O)_3$ (BTC = benzene-1,3,5-tricarboxylate). The adsorbates display significant differences in their kinetics on RPM1-Co (i.e., there are sizable differences in the time required for each gas to reach equilibrium after it is allowed access to the substrate). Our equilibrium measurements show that CF_4 is sterically precluded from adsorbing in the small tetrahedral-shaped side pockets present in Cu-BTC. We will compare our experimental results with predictions for how adsorption kinetics depends on the size of the adsorbate and on those of the pores present in the substrate.

Vaiva Krungleviciute
Southern Illinois University

Date submitted: 26 Nov 2007 Electronic form version 1.4