Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Hydrogen Adsorption and Its Displacement of Carbon Dioxide in Microporous Transition Metal Cyanides SITTICHAI NATESAKHAWAT, JEFFREY CULP, CHRISTOPHER MATRANGA, BRADLEY BOCKRATH, U. S. Dept. of Energy, National Energy Technology Laboratory — The adsorption properties of H_2 and CO_2 have been investigated in $M_3[Co(CN)_6]$ (M = Cu, Zn) Prussian blue analogues and $M[Fe(CN)_5NO]$ (M= Co, Ni) metal nitroprussides. Adsorption isotherms show that both materials adsorb between 1.4 to 1.7 wt % of H_2 at 77 K and 1 atm. The isosteric heat of adsorption was between 6.5 to 7.5 kJ/mol. Kinetic measurements are conducted in a specially designed vacuum system which is coupled to a Fourier-Transform Infrared Spectrometer. In a typical experiment, an infrared active gas (i.e CO_2) is physisorbed in the transition metal cyanide and the system is later back-filled with H_2. The infrared intensity of the physisorbed CO_2 is monitored to deduce the kinetics and energetics associated with its displacement from the transition metal cyanide by H_2. We have identified several kinetic steps, measured the rate constants, and examined the temperature dependence of this displacement process.

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Date submitted: 23 Nov 2005 Electronic form version 1.4