Gas Sorption Properties of Microporous Magnesium Formate

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Metal-organic frameworks (MOFs) are crystalline nanoporous materials comprised of metal clusters connected three-dimensionally by multi-topic organic ligands. This hybrid architecture opens the possibility to design and synthesize a great variety of new porous materials.[1] However, many MOFs are sensitive to moisture, limiting in this way their potential utilization in industrial applications. To overcome this problem the use of small, hard metal ions (Mg^{2+}, Al^{3+}) in MOF could lead to air and water stable materials.[2]

We report here the synthesis and gas sorption properties of fully evacuated microporous magnesium formate, $[Mg_3(O_2CH)_6]$, a porous 3-D network with 1-D channels. The material exhibits permanent porosity with 496 m^2 g^{-1} BET surface area. Gas sorption studies showed a 1.38 wt% H_2 uptake at 77 K/1 bar, a 2.18 mmol g^{-1} CO_2 at 298 K/1 bar and a high NH_3 uptake of 5.37 mmol g^{-1} at 298 K/1 bar. The framework holds its structural integrity upon various circles of NH_3 adsorption and desorption rendering the material a potential candidate in applications for the removal of harmful gases and contaminants.

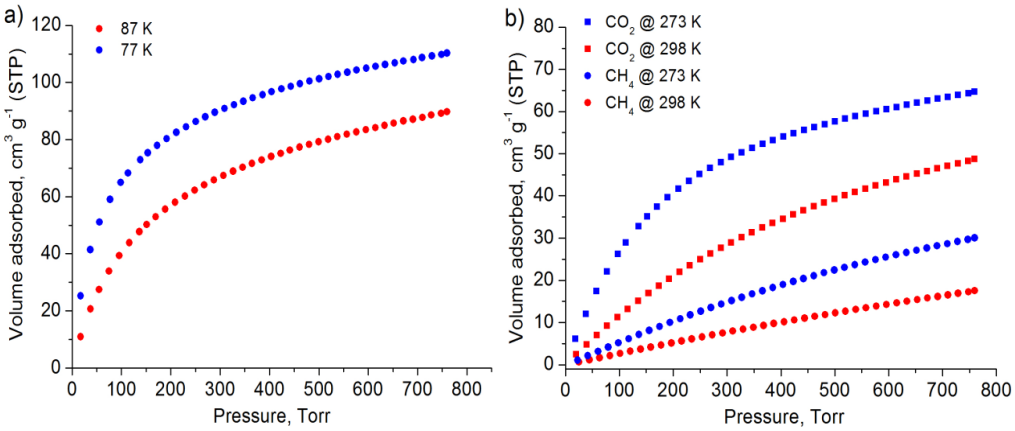

Figure 1. (a) Hydrogen adsorption isotherms at 77 K and (b) CO_2 and CH_4 adsorption isotherms at 273 K and 298 K.

References

[1]Wang C., Liu D., Lin W., *J. Am. Chem. Soc.* **135**, 13222 (2013).
[2]McDonald T. M., Lee W. R., Mason J. A., Wiers B. M., Hong C., Long J.R., *J. Am. Chem. Soc.* **134**, 7056 (2012).

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