

Structural, Sorption and Thermal Analyses of Porous Isostructural MIL-47-X (X = -F, -Cl, -Br, -CH₃, -OH) Metal-Organic Frameworks

Shyam Biswas and Pascal Van Der Voort; Department of Inorganic and Physical Chemistry, COMOC: Center for Ordered Materials, Organometallics and Catalysis Ghent University, Ghent, Belgium

Metal-organic frameworks (MOFs) have attracted a great deal of interest due to their applications in gas storage/separation and catalysis.[1] The functionalization of such solids achieved either by employing pre-functionalized linkers or by postsynthetic modification, affects their sorption, selectivity or breathing property as well as thermal and chemical stability.[2] Herein, we report on the structural, sorption and thermal analyses of functionalized MIL-47-X (X = -F, -Cl, -Br, -CH₃, -OH) solids, prepared by using modified terephthalate linkers.

The compounds were synthesized in a rapid microwave-assisted hydrothermal route (170 °C, 30 min, 100 W). Thermogravimetric analyses show high thermal stability (330-385 °C). The cell parameter determination from X-ray powder diffraction (XRPD) data (Fig. 1a) confirms their structural similarity with parent MIL-47. The thermally activated solids exhibit significant microporosity (Fig. 1b, $S_{\text{BET}} = 305\text{-}872 \text{ m}^2 \text{ g}^{-1}$).

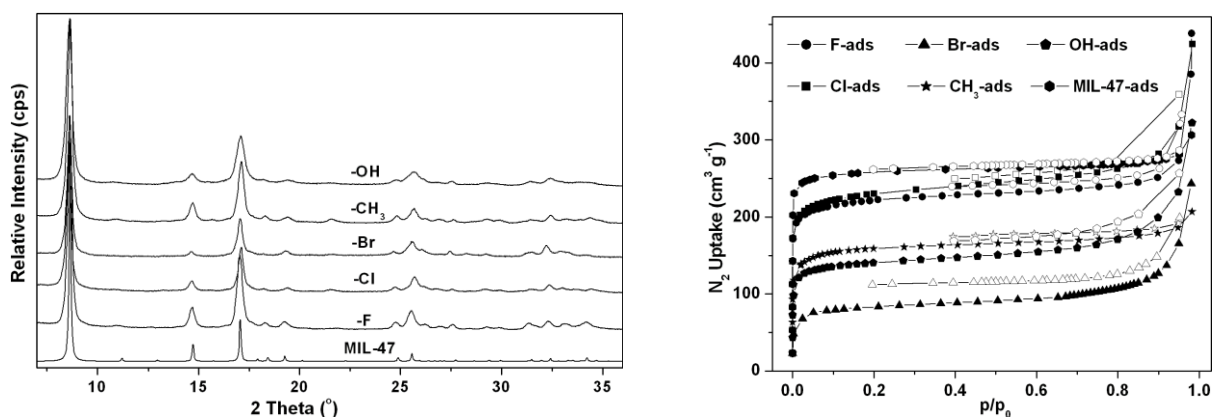


Fig. 1. (left) XRPD patterns, and (right) N₂ sorption isotherms for MIL-47-X solids.

[1] (a) *Chem. Soc. Rev.* **2009**, 38, 1201-1508. (b) *Chem. Rev.* **2012**, 112, 673-1268.

[2] S. Biswas, T. Ahnfeldt, N. Stock, *Inorg. Chem.* **2011**, 50, 9518-9526.