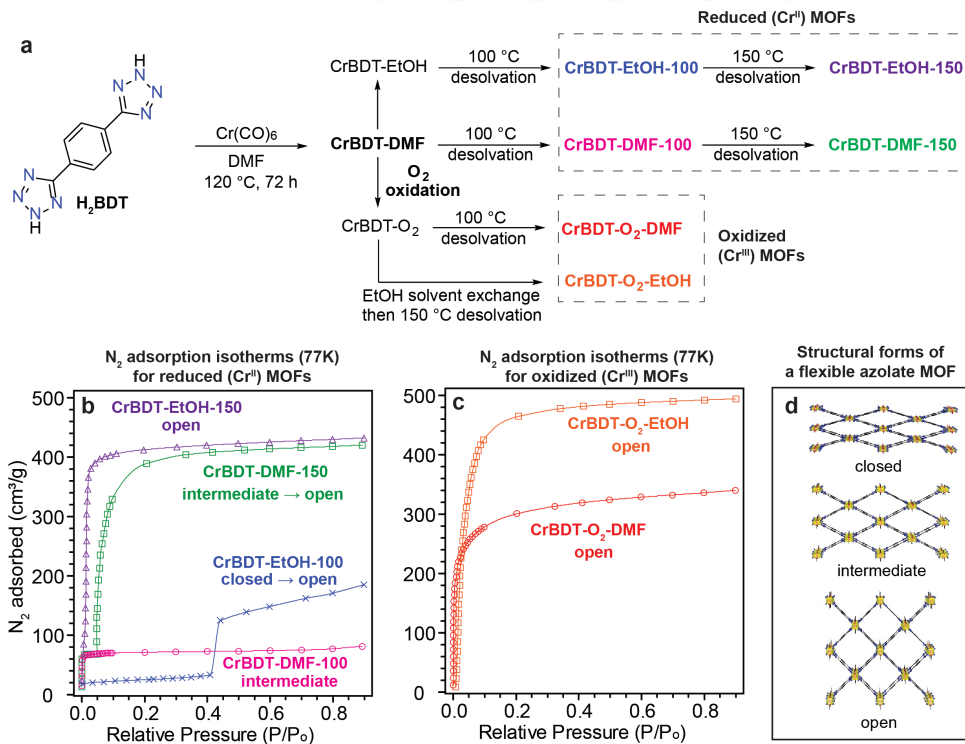


Metal-mediated Breathing Effects in Metal-organic Frameworks

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Porous materials that undergo structural changes in response to external stimuli hold potential in molecular sensing and gas storage or separation applications. The accordion-like breathing behavior of a metal-organic framework (MOF) constructed from ditetrazolate linkers and redox active Cr metal ions has been investigated. The reduced (Cr^{II}) form of CrBDT has a flexible structure that responds to changes in N_2 pressure, and the response is dependent on the nature and amount of guest solvent molecules residing in the porous framework. Oxidized (Cr^{III}) forms of CrBDT do not exhibit N_2 adsorption steps indicative of breathing behavior, demonstrating that metal-based redox processes can be used to regulate structural flexibility.



(a) Synthesis of CrBDT MOFs. (b) and (c) N_2 adsorption isotherms of reduced and oxidized CrBDT MOFs. (d) Structural forms of a flexible MOF.