

MS30-2-1 Mixed-ligand metal-organic frameworks incorporating rigid and flexible linkers
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K. Muguru¹, C. Oliver¹

¹University of Cape Town - Cape Town (South Africa)

Abstract

Metal-organic frameworks (MOFs) form a class of inorganic-organic hybrid porous crystalline materials containing metal ions or metal clusters bridged by organic ligands via coordination bonds to form one-, two-, or three-dimensional networks with useful properties.^{1,2} The flexibility of changing the metal centres and organic ligands allows a wide range of MOFs to be designed, and by careful selection of the constituents, MOFs with desired structures and tailored properties can be produced. Mixed-ligand MOFs have two or more different types of organic linkers that provide the possibility of tuning pore size or shape, since ligands of various sizes could be used to synthesize these materials, thus allowing further tailoring of properties.³ We report the synthesis involving the reaction of 1,3,5-benzenetricarboxylic acid (H₃btc) and 1,3-bis(4-pyridyl)propane-N,N'-dioxide (bppdo) with Co(NO₃)₂·6H₂O in N,N'-dimethylformamide (DMF), methanol (MeOH) and H₂O which afforded [Co_{6.5}(btc)₄(bppdo)₂(OH)(H₂O)_{7.5}]_n·n(H₂O)_{3.5}(DMF) (**1**). The compound was characterised by variable-temperature X-ray diffraction and thermal analysis and have showed high porosity (BET surface area, 548 m²/g). The gas sorption properties of **1** are dependent upon the activation method, for example, room-temperature and thermal evacuation, and activation involving solvent exchange. The MOF display high N₂, H₂, CO₂, gas uptake capacities at room temperature. Water vapour sorption of **1** show that it readily absorbs water vapour at low relative pressures. The significant adsorption of different gas and vapour is due to the presence of micropores and unsaturated metal sites in the MOF. We further report the synthesis involving the reaction of H₃BTC and 1,2-bis(4-pyridyl)ethane-N,N'-dioxide (BPEDO) with CuSO₄·5H₂O in dimethylacetamide (DMA), ethanol (EtOH) and H₂O which resulted in [Cu₄(btc)(bpedo)_{0.5}(SO₄)_{0.5}(OH)(H₂O)]_n (**2**). Compound **2** exhibit a high uptake capacity for H₂O.

References

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