

Syntheses and characterization of mononuclear and polynuclear copper(II) complexes with imine ligands

Rodrigo B. Fazzi, Ana M. da Costa Ferreira

Departamento de Química, Instituto de Química – Universidade de São Paulo

E-mail: rodrigo.fazzi@usp.br

The search for new forms of clean energy is growing up remarkably in the last years. The appearance of the so called metal-organic framework (MOF) compounds as useful functional materials created a large and promisor field of research¹. It's usually high surface area and porous structure, additionally to the presence of aromatic groups support the adsorption of small molecules, as CO₂, CH₄, or H₂. These properties stimulated interesting studies aiming applications of such material in fuel cells, storage and separation of gases, or vehicles filters².

Extensive studies indicated that the porous dimension and ligand structure have an intrinsic correlation to the gas storage capacity, but the metal influence is still not very well explored.

Trying to understand the influence of the metal center on these MOF structures, we synthesized two mono-, a di-, and a polynuclear copper complex, as well as a polynuclear manganese complex with imine ligands. The obtained compounds were characterized by different techniques (UV/Vis, IR and EPR spectroscopy, XRD, thermogravimetric analysis, surface area, SEM images, and elemental analysis). The determined properties of the mononuclear complex, obtained by usual synthesis in solution, were then compared to those of a polymer compound. Experimental results confirm different structure for the analogous complexes of manganese and copper, as shown below:

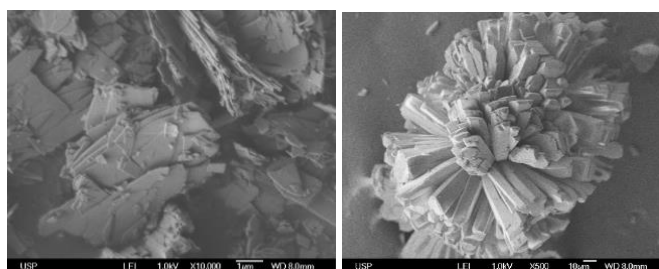


Fig. 1 and 2: SEM images and structure of polymer [Cu(hibim)pz]_n in the left, and [Mn(hibim)]_n in the right.

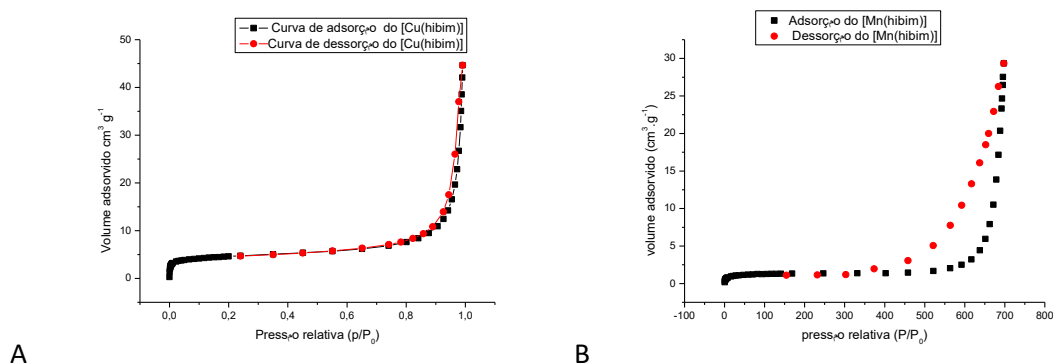


Fig. 3: Adsorption and desorption isotherms for [Cu(hibim)(pz)]_n (A), and [Mn(hibim)]_n (B).

References:

- 1- Silva, P.; Vilela, S. M. F.; Tome, J. P. C. and Paz, F. A. A., Chem. Soc. Rev., 2015, 44, 6774-6803.
- 2- Kumar, P.; Kim, K.; Kwon, E. E. and Szulejko, J. E. J. Mater. Chem. A, 2016, 4, 345-361.

FAPESP, CNPq, CAPES, CEPID-Redoxoma