

Discriminative Detection of Aliphatic Amines using Electron Deficient Five-fold Interpenetrated Coordination Polymer

Prabu M., Anupam Anand Ojha, Vennapusa Sivaranjana Reddy, Sukhendu Mandal*

School of Chemistry, IISER-Thiruvananthapuram,

Trivandrum – 695 016, Kerala, INDIA (E-mail: prabu.chemist14@iisertvm.ac.in)

Abstract:

Metal Organic Frameworks (MOFs) or Coordination Polymers (CPs) are inorganic-organic hybrid crystalline materials with diverse architectures and variable pore size constructed by the linking of metal ions or metal clusters and organic ligands.¹ Chemical entities such as organic amines have enormous importance in polymer, dye and pharmaceutical industries. However, most of these amines are colorless, making their differentiation via visual inspection difficult. These amines are also hazardous to the environment, and hence spillage of these materials should be sensed efficiently in order to prevent any probable harm.²⁻³ The example of fluorescence intensity enhancement “turn on” is rare, that is essential for the device application. In this regard, porous crystalline chemical sensors are quite interesting because of their quick, reversible and recyclable sensing ability.⁴⁻⁵ Here, we have synthesized a new three-dimensional electron deficient five-fold interpenetrated coordination polymer, namely [Zn(PA)(BPE)]. This compound can discriminatively detect aliphatic amines in solid state, solution state and vapour phase. Theoretical calculations showed that the ground state dipole moment of the corresponding amines direct the order of fluorescence enhancement.

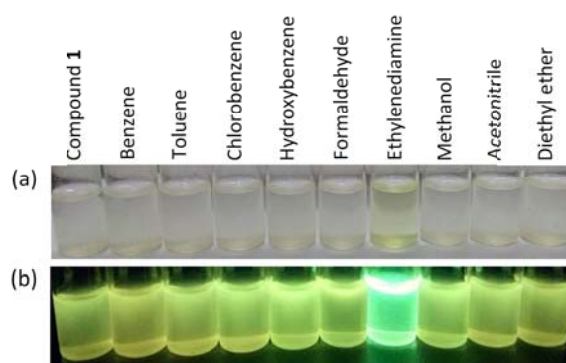


Figure: Photograph for the selective detection of amine over other organic molecules (a) under visible light and (b) under ultraviolet light

References and Notes:

1. Li, H.; Eddaoudi, M.; O'Keffee, M.; Yaghi, O. M. *Nature* **1999**, *402*, 276-279
2. Lee, B.; Scopelliti, R.; Severin, K. *Chem. Commun.* **2011**, *47*, 9631-9641
3. Zhang, X.; Liu, X.; Lu, R.; Zhang, H.; Gong, J. *J. Mater. Chem.* **2012**, *22*, 1167-1172
4. Davis, M. E.; Lobo, R. F. *Nature* **2002**, *417*, 813-821
5. Kumpf, J.; Freudenberg, J.; Fletcher, K.; Drew, A.; Bunz, U. H. F. *J. Org. Chem.* **2014**, *79*, 6634-6645