Synthesis, characterization, adsorption and catalytic properties of an amino functionalized Metal Organic Framework: NH$_2$-MIL-47 (V)

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In recent years MOFs have become more and more a topic of interest in heterogeneous catalysis$^{1,2}$. The rigidity of some MOFs allows further functionalization without changing the original topology, either by a post-functionalization or by the use of a prefunctionalized linker. This way, subtle changes can be induced in the catalytic or sorption properties. In this contribution, we report on the synthesis of the amino functionalized V-MOF with MIL-47 topology. This NH$_2$-MIL-47 is fully characterized. The CO$_2$ and CH$_4$ adsorption properties of this NH$_2$-MIL-47 have been investigated and are compared to the parent MIL-47 (Fig.1 A). It is concluded that amino groups only enhance the CO$_2$ adsorption in MOFs if they influence the flexibility of the network, which is not the case in the rigid NH$_2$-MIL-47$^3$. Moreover, the NH$_2$-MIL-47 was post-functionalized with TiO(acac)$_2$ (Fig.1 B). The resulting [Ti] NH$_2$-MIL-47 is being tested for it's photocatalytic performance in the oxidation of cyclohexene using molecular oxygen as oxidant.

Fig 1 A) Adsorption isotherms of CO$_2$ and CH$_4$ on MIL-47 and NH$_2$-MIL-47  B) Post-functionalization of NH$_2$-MIL-47 with TiO(acac)$_2$