22nd Iranian Inorganic Chemistry Conference,
23-25 August, 2023
University of Kurdistan

Synthesis and characterization of bimetallic metal-organic frameworks based on Zr and Cd and composite it with g-C_3N_5 for absorption and photocatalytic degradation of organophosphorus compounds

Sajad Akbari[1], Kourosh Adib*[1], Esmail Sohouli[1]

[1]*Department of Chemistry, Faculty of Basic Sciences, Imam Hossein University, Tehran Iran*

* *kpadib@ihu.ac.ir*

Metal–organic frameworks (MOFs) are a new group of molecular networks arranged in a three-dimensional skeleton with metal centers and bridged organic ligands around them [1]. The MOFs have a remarkable performance in the fields of adsorption [2], separation [3], photocatalysis [4], and drug delivery [5]. On the other hand the adsorption and photocatalytic degradation of hazardous materials such as organophosphorus compounds by adsorbents with high adsorption capacities and easy separation from sample solutions are highly desirable. In this research, the photocatalytic degradation of organophosphorus compounds in real specimens was developed using an bimetallic metal-organic framework composite with the addition of C_3N_5 as an adsorbent. The adsorption of organophosphorus compounds on Cd/Zr-MOF/C_3N_5 was optimized by considering various factors including pH, amount of adsorbent, contact time and sample concentration. Results with scavengers allowed concluding that $O_2^{\bullet-}$ radicals are the main reactive species, although photogenerated $^{\bullet}OH$ radicals and electrons also contribute to the degradation.

Keywords: bimetallic MOF, MOF/C_3N_5, photocatalyst, photocatalytic degradation, organophosphorus compounds

References

[1] Ashouri, V., K. Adib, and M.R. Nasrabadi,. *New Journal of Chemistry*, **2021**, 45, 5029-5039.
[2] Zhang X, Yang Y, Lv X, Wang Y, Liu N, Chen D, Cui L,. *J Hazard Mater*, **2019**, 366, 140–150.
[3] Xu G, Meng Z, Guo X, Zhu H, Deng K, Xiao C, Liu Y,. *Comput Mater Sci*, **2019**, 168:58–64.
[4] Wang A, Zhou Y, Wang Z, Chen M, Sun L, Liu X,. *RSC Adv*, **2016**, 6, 3671–3679.
[5] Suresh K, Matzger AJ,. *Angew Chem Int Ed*, **2019**, 58, 16790–16794.