Tiefeng Xu et al., J Chem Eng Process Technol 2018, Volume 9
DOI: 10.4172/2157-7048-C2-015

Visible-light-assisted peroxymonosulfate activation and novel mechanism for degradation of contaminants over g-C_3N_4 coordinating with iron(II) phthalocyanine catalyst

Tiefeng Xu, Fei Wu, Wangyang Lu, Nan Li and Wenxing Chen
Zhejiang Sci-Tech University, China

Recently, Peroxymonosulfate (PMS)-based Advanced Oxidation Processes (AOPs) have received increasing attention because of their capability and adaptability in decontamination. The couple of solar light and PMS activation is an environmentally friendly and efficient strategy for environmental remediation. Herein, the iron hexadecachlorophthalocyanine (FePcCl16) was used to coordinate with graphitic carbon nitride (g-C_3N_4), which was functionalized by pyridine-based ligand Isonicotinic Acid (INA) to prepare a distinctive catalyst, g-C_3N_4-INA-FePcCl16. The experimental results revealed that g-C_3N_4-INA-FePcCl16 can activate PMS efficiently for the elimination of Carbamazepine (CBZ) under visible light irradiation over a wide pH range. Upon irradiation with visible light, CBZ was destroyed by the solider g-C_3N_4 with generated sulfate ($SO_4^{\bullet-}$) and hydroxyl (•OH) radicals, on the other hand, high-valent iron (Fe (IV)=O) species accompanied by $SO_4^{\bullet-}$ and •OH radicals were produced by excited-state FePcCl16 (*FePcCl16) during oxidation, which is different from a traditional PMS activation system. The axial pyridine-based ligand was protected under the FePcCl16 macrocyclic structure shield. Noteworthy, in the absence of visible light, g-C_3N_4-INA-FePcCl16 showed a higher catalytic performance than pure g-C_3N_4, FePcCl16 and a mechanical mixture of the two. This study allows for the construction of an effective and environmental catalytic system, which can be applied to purify water that contains refractory pollutants.

Biography

Tiefeng Xu has graduated in Textile Fiber Materials & Processing Technology, Zhejiang Sci-Tech University, China. Her research interests are focused on photoelectrochemistry, photocatalysis and photoreactors.

xutiefeng@foxmail.com

Notes: