Preparation of Novel Mo, S-codoped TiO_2 Nanoparticulate as High Productive Photocatalyst in Degradation of Methyl Orange as Organic Pollutant

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Abstract

The current study deals with probing to synthesis of a novel high efficient visible-light-active photocatalyst with excellent catalytic activity in decomposition of the probe pollutant. In this regards, TiO_2 nanopartciels were doped with nonmetal (S) and metal (Mo) and the catalysts of S-TiO_2, Mo-TiO_2 and Mo, S-codoped TiO_2 were prepared with different percent of dopants. The all prepared photocatalyst samples were characterized by various analytical techniques including SEM, EDX, XRD, DRS, and FTIR. XRD results revealed that only anatase phase exists in the all of samples and by using scherr equation, the size of nanoparticles was calculated to be around 11-13 nm. EDX analysis confirmed the incorporation of both the dopants in the TiO_2 lattice. SEM analysis showed the nanoparticulate structure of the prepared catalysts. Also, in order to investigate the photocatalysis activity of prepared nanoparticles and determining the optimum amount of dopant element, photo-decomposition reaction of Methyl orange (MO) under UV and Visible irradiation was carried out. It was found that the sample Mo(0.06%),S(0.05%)-codoped TiO_2 nanoparticles showed the best result among all catalysts and degraded the MO in a very short time under visible light irradiation.

Keywords: Nanoparticle; Mo, S-codoped TiO_2; Photocatalyst; Visible Light

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