PREPARATION OF NICKEL PHOSPHATE ON SILVER PHOSPHATE VIA IMPREGNATION METHOD FOR PHOTOREDUCTION OF HEXAVALENT CHROMIUM

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ABSTRACT

PREPARATION OF NICKEL PHOSPHATE ON SILVER PHOSPHATE VIA IMPREGNATION FOR PHOTOREDUCTION OF HEXAVALENT CHROMIUM

Hexavalent chromium Cr(VI) is toxic waste that lead to water pollution and give a negative impact on health and environment. The photocatalytic reduction is effective method to reduce Cr(VI) to harmless toxic. Nickel Phosphate ($Ni_3(PO_4)_2$) as semiconductor photocatalysts shows a great potential for reduction of Cr(VI) such as visible light driven and excellent stability of physicochemical. However, $Ni_3(PO_4)_2$ can still have recombination photogenerated electron-hole due to the single photocatalyst and narrow bandgap. Consequently, $Ni_3(PO_4)_2$ will be modified with Silver Phosphate (Ag_3PO_4) to inhibit the recombination photogenerated electron-hole pair and enhance the performance of photoreduction of Cr(VI). In this study, the effect of $Ni_3(PO_4)_2$ loaded on Ag_3PO_4 were synthesized by using impregnation method. The physical and chemical properties of $Ni_3(PO_4)_2$ loaded on Ag_3PO_4 were analyzed using FTIR, FESEM and UV-vis/DRS techniques. The performance on photoreduction of Cr(VI) were determine as followed: 5 NP/AP (98%) > 1 NP/AP (96%) > 10 NP/AP (81%) > 15 NP/AP (78%) > Ag_3PO_4 (78%) > $Ni_3(PO_4)_2$ (74%). 5 NP/AP was highest performance compared to other photocatalysts due to well dispersed of $Ni_3(PO_4)_2$ on Ag_3PO_4 as well as lowest bandgap which enhance the photoreduction of Cr(VI). Then, NP/AP was carried out for other parameters such as catalyst dosage, concentration of Cr(VI) and the effect of scavenger. The result shows the highest performance at concentration of Cr(VI) at 10 mg/L, catalyst dosage at 0. 375 g L^{-1} and the main species in this reaction was electron based on the scavenger study. Overall, the $Ni_3(PO_4)_2$ on Ag_3PO_4 successfully contribute on photoreduction of Cr(VI) under visible light.