

Photocatalytic Activity of M-N-TiO₂ Photocatalysts under Visible Light

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N-TiO₂ nanopowder and TiO₂ nanotube photocatalysts were synthesized by the sol-gel and alkaline hydrothermal methods, respectively. These catalysts were doped with transition metal (M= Pt, Cu, Cr, Fe) using different doping and treatment methods such as impregnation and H₂ reduction, impregnation and NaBH₄ reduction, and direct assembly. The crystalline structure and morphology of the prepared catalysts were characterized by XRD, FE-SEM, TEM. Band-gap and light absorbance were measured by UV-Vis-DRS. The prepared photocatalysts were used for decomposition of methylene blue (liquid phase) and acetone (gas phase). A photo-reactor was equipped with 4 BLB lamps (40 W) and 4 fluorescent lamps (80 W). UV-VIS spectrometer and gas chromatography were used for analysis of the products of the photo-decomposition reaction. In the photo-decomposition of methylene blue, M-N-TiO₂ nanopowders prepared by the impregnation and NaBH₄ reduction method showed twofold higher photoactivity under ultraviolet-A than the other catalysts which prepared by other methods, also showed outstanding photoactivity under visible light but the other ones prepared by other methods showed poor activity.