Visible light driven photocatalytic degradation of wastewater by ionic liquid-assisted synthesized Ag_3VO_4 nanostructures

Abstract

Ag_3VO_4 nanostructures, synthesized by ionic liquid-assisted precipitation method, were used as an effective visible light driven photocatalytic system for azo dye degradation and bacteria inactivation. The prepared samples were characterized by X-ray diffraction powder (XRD), diffuse reflectance spectroscopy (DRS), Furrier transform infrared (FTIR), scanning electron microscopy (SEM), and nitrogen adsorption-desorption isotherms (BET) methods. Photodegradation mechanism was investigated the results showed that the bacterial regrowth was not allowed after photocatalytic treatment. The photogenerated positive holes reacted with the species in the solution and produced reactive radicals such as $OH^{\bullet}$, $HO^{\bullet}_2$, and $O^{\bullet -}_2$ which are responsible for wastewater degradation. The effect of some parameters such as solid dosage, waste concentration, addition of scavenger, and stirring rate on the photoinactivation efficiency was studied and the experimental conditions were optimized to removal of real industrial wastewater.

1. introduction

2. Materials and methods

$AgNO_3$ and NH_4VO_3 were used as silver and vanadium source, respectively. Casein and tetra methyl ammonium hydroxide (TMAOH) were used as template agents. All of the chemicals