Magnetised titanium dioxide (TiO₂) for water purification: preparation, characterisation and application

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ABSTRACT

The study of titanium dioxide (TiO₂) as a photocatalyst for water purification has attracted significant attention over the past four decades. However, the separation of photocatalyst from water suspension may be difficult, costly and jeopardise the use of this water treatment technology. Recently, the development and production of magnetised TiO₂ have been achieved to offer a solution for the photocatalyst separation problem. This paper discusses the preparation techniques, characterisation and the applications of magnetised TiO₂. Many researchers have studied magnetised TiO₂ photocatalysts but the lack of articles discussing the water purification processes is still slowing any advance in this field. Here, the progress of the scientific research on preparation techniques to coat magnetic particles by materials such as organic polymers, silica, magnesia, and alumina are reviewed to compare and discuss recent findings. The doping of photoactive TiO₂ photocatalyst into the magnetic-coated particles is also emphasised. In addition, the characterisation of magnetised TiO₂ in terms of physicochemical properties and operating conditions produced by each technique are critically reviewed. Moreover, examples of applications of TiO₂ and magnetised TiO₂ photocatalyst in water purification are summarised. In general, the effectiveness of organic removal by magnetised TiO₂ is still lower compared to single phase TiO₂. The future prospect of this field is deliberated to develop a novel, economic and efficient magnetised TiO₂ photocatalyst, which has high organic removal properties.

Keywords: Photocatalyst; Purification; Characterisation; Magnetised TiO₂

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