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Comparative Performance Analysis of Crushed Recycled Glass as Granular Filtration Media in Swimming Pool Water Treatment

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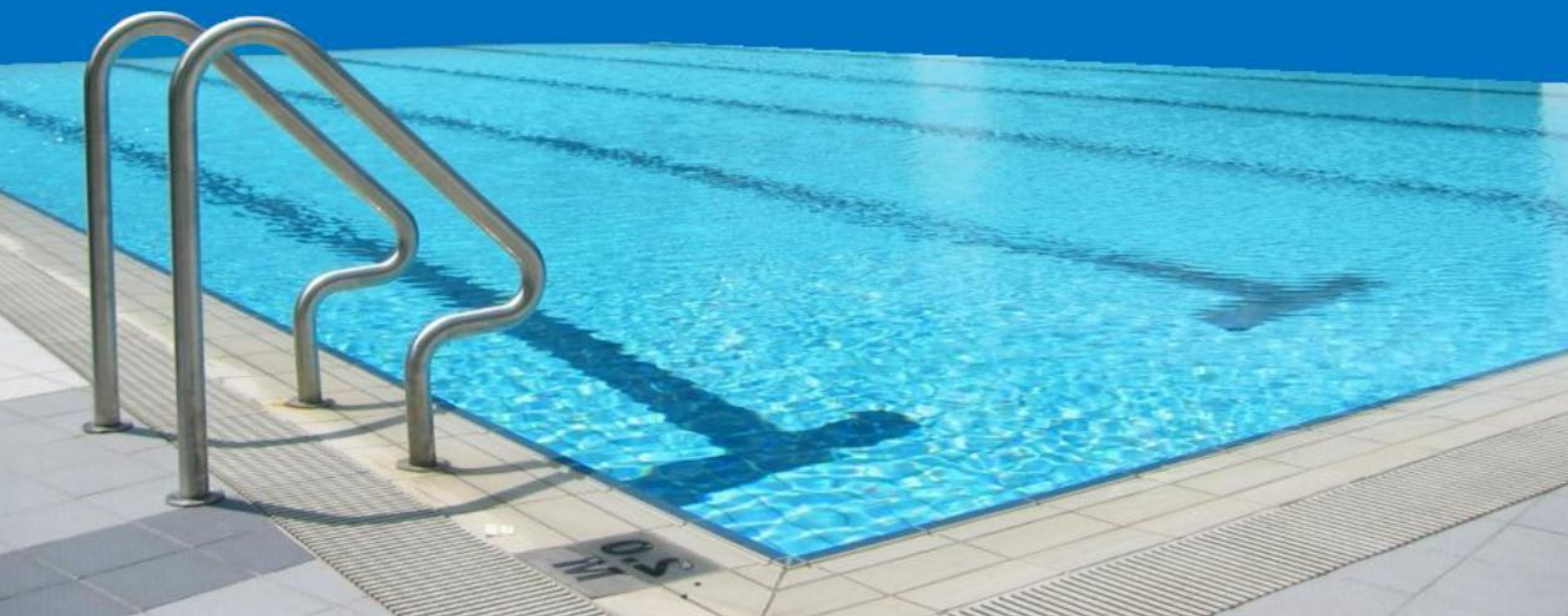

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Comparative Performance Analysis of Crushed Recycled Glass as Granular Filtration Media in Swimming Pool Water Treatment

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Abstract

Filtration is essential to reducing the turbidity of swimming pool water caused by suspended particles or contaminants and improve the quality of the water for bather health and safety. One of the most common types of filter to treat swimming pool water is a packed-bed granular media filter, usually filled with sand or zeolite. As a more sustainable media, crushed recycled glass was compared theoretically and experimentally to sand and zeolite media. Theoretically, the glass will perform slightly better but similar to sand. Both media should also perform remarkably better than the grade of zeolite used. To support and verify the theory, experimental testing was conducted using a specially designed column test apparatus. Three column tests were conducted using the designed apparatus which illustrated that overall the glass (DK M10) produced better turbidity reduction and particle removal. Based on the results the glass media (DK M10) was deemed more efficient theoretically and experimentally than traditional sand and zeolite media for use as swimming pool granular filtration media.

1. Introduction

In recent years, there has been an increasing awareness of public health issues as a consequence of poor water quality in recreational waters (Perkins, 2000; Uhl &Hartmann, 2005; WHO, 2006; Croll et al., 2007; Lee et al., 2009; Dorevitch et al., 2011). As a result swimming pool water treatment technology is evolving from a simple stagnant body of water for bathing to full scale water and wastewater treatment processes. The treatment of swimming pool water can differ depending on the type of pool and expected contaminants. In general, the process of treating swimming pool water includes circulation, filtration, chlorination and water balancing (pH correction etc) (Williams &Langley, 2001; PWTAG, 2009). Filtration is essential to reducing the turbidity of the water caused by suspended particles or contaminants and improve the quality of the water (Korkosz et al., 2011). This is vital to reduce ingestion of harmful contaminants whilst swimming and to maintain visibility of swimmers to lifeguards or supervising guardians (WHO, 2006; PWTAG, 2009; Dorevitch et al., 2011)

The most common filters used in swimming pool treatment to collect contaminants are cartridge, diatomaceous earth and medium/high pressure packed-bed granular media filters (Pool Water Treatment Advisory Group (PWTAG), 2009). The granular media used in pool filters is usually sand or zeolite. Each type of media is used in the same way, to create a packed-bed filter in which contaminants are captured within the pore spaces and by adhering to the surface of the grains.