ISSN: 1391-8796
Proceedings of 8th Ruhuna International Science & Technology Conference
University of Ruhuna, Matara, Sri Lanka
February 17, 2021

TiO_2 Coated Glass Beads for Photocatalytic Degradation of Methylene Blue

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Availability of clean water has become a global issue due to the pollution of water bodies. Anatase form of TiO_2 powder is reported as a photocatalyst for degradation of many organic pollutants. Separation of anatase powder from water is difficult. Therefore, the objective of this research was to develop anatase coated glass beads (9.5mm) and to study their photocatalytic activity on aqueous solutions of methylene blue under solar irradiation. Experiments were carried out in triplicate. Concentration of methylene blue solutions were determined using UV-VIS absorption spectroscopy (λ_{max} = 658 nm). Surface of glass beads modified with HF acid (5 % v/v) were coated with anatase and air-annealed at 450 °C. Average weight of the coating of a glass bead was 0.03 g. Powder XRD showed presence of anatase only. SEM showed porous morphology. Rate of degradation of 10 ppm methylene blue increased twice when number of glass beads increased from 5 to 10. Rate of degradation decreased 4.5 times when concentration of methylene blue increased from 5 to 20 ppm. Annealing temperature at 650 °C did not affect the photocatalytic degradation rate of methylene blue (10 ppm). Reusability studies on glass beads used for three times showed almost the same photocatalytic efficiency. 100 % photocatalytic degradation of 10 ppm methylene blue solution occurred in 100 min. (10 glass beads). Control experiments showed the requirement of anatase coating and solar irradiation. Coated glass beads prepared at 450 °C in the above manner is suitable to degrade methylene blue under solar irradiation.

Key words: *Anatase, photocatalysis, glass beads, methylene blue*

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