

Preparation and Characterization of Titania-Coated Glass Fibrous Filters Using Aqueous Peroxotitanium Acid Solution

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Abstract : Aqueous peroxotitanium acid solution prepared from the TiO₂ fluorinated by F₂ gas was used for the TiO₂ coating on glass fibrous filters in this study. The coating of TiO₂ on the surface of glass fibers was carried out at 120°C and for 15 min ~ 24 h with aqueous peroxotitanium acid solution using a hydrothermal synthesis autoclave reactor. The morphology TiO₂ coating layer was largely dependent on the reaction time, as shown in the results of scanning electron microscopy and energy dispersive X-ray spectroscopy. Increasing the reaction times, the TiO₂ layer on the glass expanded uniformly. Moreover, the surface fluorination of glass fibers can promote the formation of the TiO₂ layer on the surface. The photocatalytic activity of prepared titania-coated glass fibrous filters was investigated by both the degradation test of methylene blue (MB) and the decomposition test of gaseous acetaldehyde. The MB decomposition ratio with fluorinated samples was about 95% for 30 min of UV irradiation time, and it was much higher than that (70%) with the untreated thing. The decomposition ratio (50%) of gaseous acetaldehyde with fluorinated samples was also higher than that (30%) with the untreated thing. Consequently, photocatalytic activity is enhanced by surface fluorination.

Keywords : aqueous peroxotitanium acid solution, titania-coated glass fibrous filters, photocatalytic activity, surface fluorination

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