Abstract

Titania silica composites (TSC) with various Ti/Si ratios were synthesized via sol-gel process using less expensive precursors; sodium silicate solution as a silica source and titanium oxychloride as a titania source. The influence of varying Ti content in the composites was examined by FTIR, SEM, TEM, DTA/TGA, N_2 physisorption studies and XRD. The BET surface area of the raw materials increased with increasing Ti/Si ratio up to 2.9 (461 m^2/g) but further increase of Ti content beyond that ratio yielded composites with decreased surface area. The effect of aging evaluated in the sample with Ti/Si=2.9 revealed that aging the composite for 2 hrs yields titania-silica powder with the highest surface area (461 m^2/g). The FTIR analysis displayed the presence of a vibration band at 945 cm^{-1}, assignable to hetero linkage of the Si-O-Ti depicting the incorporation of TiO_2 into SiO_2 to form a composite. Moreover, photodegradation of methyl orange (MO) by the samples calcined at 800^oC showed that the TSC-5-800 (Ti/Si=5.6) exhibited the highest maximum photocatalytic activity of all the composites.