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## Application of Ag/TiO<sub>2</sub> Composite for Wastewater Treatment

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Wastewater containing dyes is a significant polluter of the environment which also affects human health, as textile industries generate large amounts of highly colored wastewater containing a diverse range of persistent pollutants. Titanium dioxide (TiO<sub>2</sub>) has been widely used in photocatalytic conversion reactions. Wide band gap (~ 3.2 eV) of TiO<sub>2</sub> allows the absorption of UV light only, hence lowering the efficiency of photocatalysis under solar irradiation. Reported herein is a novel green synthesis approach for Ag/TiO<sub>2</sub> composite which can act as an adsorbent and a photocatalyst in removal of MB. Incorporation of silver nanoparticles (AgNPs) to TiO<sub>2</sub> has been proven to be effective in enhancing visible light absorption. Tea extract was used as a reducing and stabilizing agent in AgNP synthesis. Adsorption capability and photocatalytic activity of Ag/TiO<sub>2</sub> composite was studied using MB and compared with TiO<sub>2</sub>. Adsorption capability was studied by measuring the change in concentration of MB in a mixture of a MB solution and the catalyst kept in dark. Within the first few minutes, ~ 70 and 12 % of MB were adsorbed onto Ag/TiO<sub>2</sub> and TiO<sub>2</sub>, respectively. Removal of ~ 90 and 35 % MB was observed by 1 h solar irradiation of the dye containing samples having Ag/TiO<sub>2</sub> and TiO<sub>2</sub>, respectively. Ag/TiO<sub>2</sub> composite prepared by this method acts as a more efficient adsorbent and a photocatalysts than TiO<sub>2</sub> in removal of MB and it is a potential material for treatment of wastewater containing MB. The reported synthesis procedure is straightforward, economical, scalable, and effective.

**Keywords:** Silver nanoparticle, Titanium dioxide, Green synthesis, Adsorption, Photocatalysis.

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